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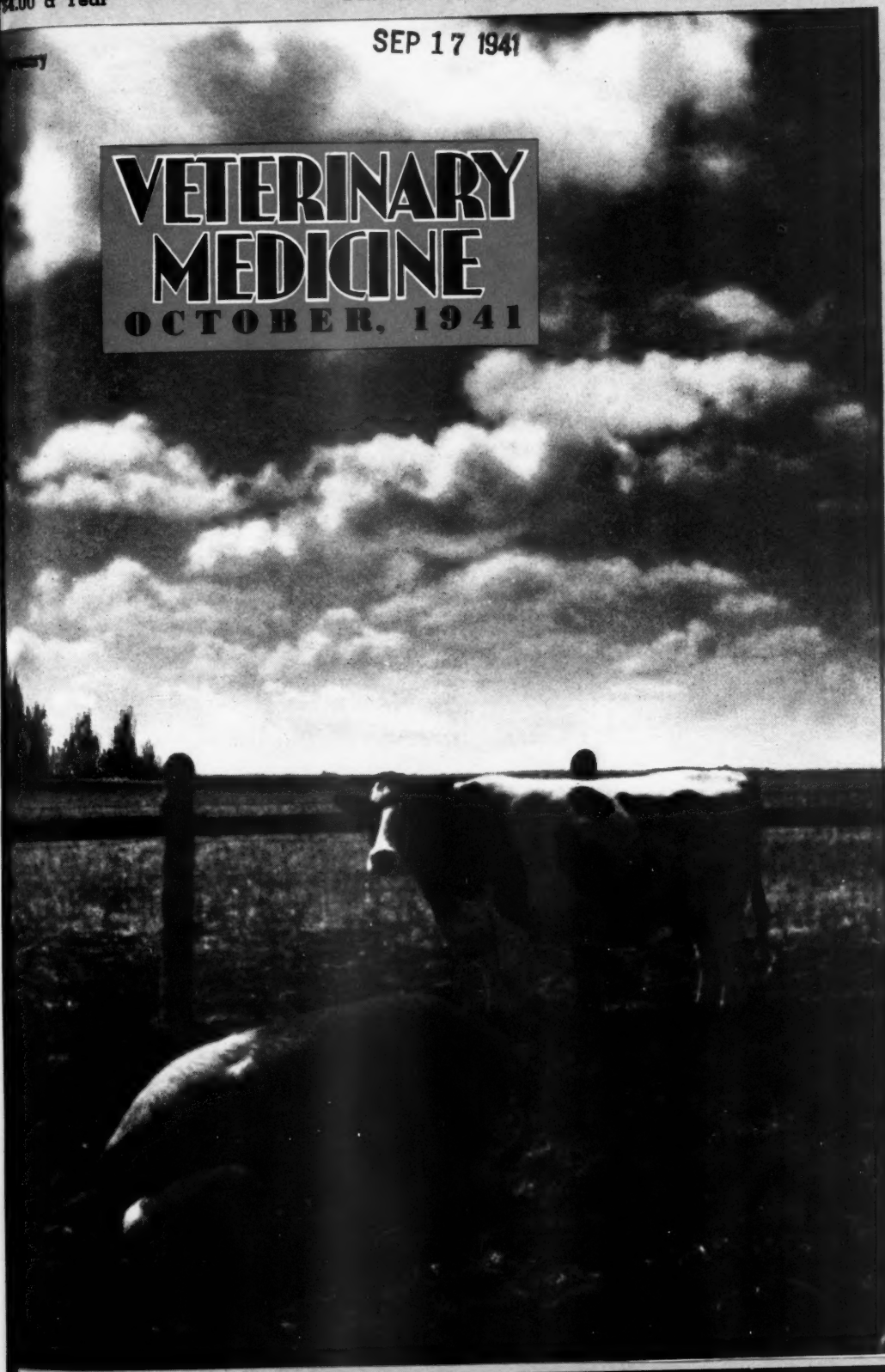
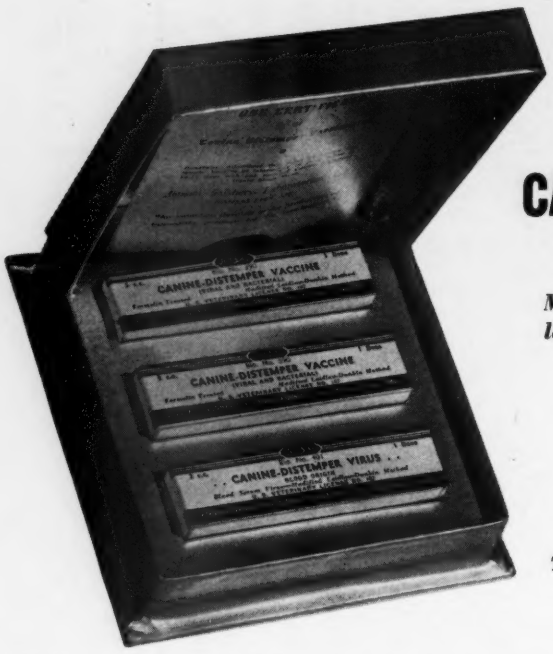
OCTOBER, 1941





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THE FRONT COVER

A scene on the Iowa farm where the "salt treatment" for enteritis originated (see pages 495-499).

VETERINARY MEDICINE

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VOL. XXXVI OCTOBER, 1941 No. 10

The famous Rothschild racing stables in France were confiscated recently and at the same time a number of horses belonging to American citizens were taken.

There are only about 14,000 bighorn sheep left in the United States. This remnant of a once numerous species is being zealously protected by the U. S. Fish and Wildlife Service.

The University of Texas has been awarded a grant of $34,520 for research in genetics by the Rockefeller Foundation for the study of the question of how new species and races of animals arise in nature.

Los Angeles County, Cal., leads in having the highest number of dairy cows of any county in the nation. Three herds have more than 1000 cows each, 18 herds have between 500 and 1000 and a great many herds have around 100. Altogether there are 100,342 dairy cows in the county.

Tularemia, a disease transmitted by ticks to man from small animals, was first described only 15 years ago. This disease occurs throughout the country but is most common in Montana where the tick *Dermacentor andersoni* and jack rabbits are prevalent. The disease is also transmitted by handling infected rabbits and other animals when preparing them for food, and by the bite of the deer fly, lice and bedbugs. When sulfanilamide is used in the treatment of tularemia it is suggested that it be given more than a week after the disease starts, as it is of value only after the defense mechanisms of the host have been brought into play. Development of a vaccine and a curative serum for this disease is in progress.

A. B. Miller, founder and president of Fontana Farms Company, died in Fontana, California, recently at the age of 62. Mr. Miller was the foremost hog producer in the world, and was also extensively engaged in the beef cattle business.

Dr. Ralph W. Phillips, head of the department of animal husbandry of the Utah State Agricultural College, has been appointed to direct investigations in animal genetics at the Beltsville, Md., Research Center. He took over this work at Beltsville July 1st.

The final report by the U. S. Public Health Service on the examination for trichinæ of 3,000 diaphragms of persons who died of various causes in Washington, D. C., and a few other hospitals, reveals that 16.3% of these persons had at some time in their lives been infested with the parasite. Of the 3,000 diaphragms, 264 contained living larvæ. More than 100 larvæ were found in eight diaphragms. It is reasonable to assume that this number suffered from clinical symptoms of the disease at some time.

Imports of codliver oil into the United States dropped from 9,000,000 gallons in 1939 to about 2,250,000 in 1940. Norway was the chief source of this supply and since it has been cut off by the war, Boston's fishing fleet is being called upon to help meet the nation's codliver oil emergency. Massachusetts fishermen have a yearly catch of 350,000,000 pounds of fish from whose livers oils rich in vitamins A and D may be expressed. These fish livers are packed in ice until arrival in port from the fishing grounds.

Illinois Bill S641 proposes to prohibit the sale and distribution of barbital and barbital combinations except by prescription from a physician, dentist or veterinarian.

Anticoagulants

Recent tests have shown that 0.25% is the minimum concentration of sodium citrate that is effective for fresh blood transfusions. In this concentration sodium citrate retards but does not prevent coagulation. A somewhat larger percentage is now being used for fresh blood transfusions and a concentration of 0.50% is commonly utilized for stored blood or for the preparation of plasma.

Many successful transfusions have been carried out in which sodium thiosulphate has been used as an anticoagulant, in place of sodium citrate.

Preventing Adhesions with Heparin

Experiments in the use of heparin (anticoagulant obtained from beef lungs) for the prevention of adhesions following abdominal operations in dogs indicate that it is highly successful in preventing the coagulation of the exudate and its organization, which brings about the adhesions. Since 2% of all major abdominal operations in man are for the relief of intestinal obstruction due to adhesions, if heparin works as successfully in practice as it has under experimental conditions, its use will mark a major improvement in abdominal surgery of both man and animals.

New Anti-Blood Clotting Chemical

A chemical with marked anti-blood clotting properties was isolated recently from spoiled sweet clover hay. It is a coumarin, and is the substance which causes sweet clover disease in cattle. Research workers at the Mayo Clinic think, as a result of trials, that it may replace heparin as an anti-clotting agent.

Advantages of the new remedy include (1) its inexpensiveness, (2) its prolonged action, and (3) its effectiveness when given by mouth.

Sulfaguanidine, the new sulfa drug that is proving a potent and swift remedy for bacillary dysentery and a life-saving aid in operations on the lower alimentary tract, now will be available to physicians generally. The peculiar property of sulfaguanidine of remaining largely in the lower alimentary canal when given by mouth, instead of being rapidly absorbed by the blood, led to its extensive trial as a remedy for infections of this part of the body.—*Science.*

Sulfadiazine, another new sulfa drug, has been found to be preferable to sulfapyridine or sulfathiazole in the treatment of pneumonia, acute infections of the upper respiratory tract, erysipelas, acute infections of the urinary tract, and acute gonorrheal arthritis and meningitis. The new drug is as effective as the older ones in the treatment of these conditions, and is much less toxic.

On the basis of an experiment with nine lambs treated with a single 10gm dose of phenothiazine and nine untreated controls, an English investigator, D. W. Kerruish, concludes that the routine administration of phenothiazine to fattening lambs would be of considerable benefit. Although none of the lambs showed clinical symptoms of worm infestation, the treated animals showed weight gains strikingly in excess of the untreated controls during the eleven-week experimental period.

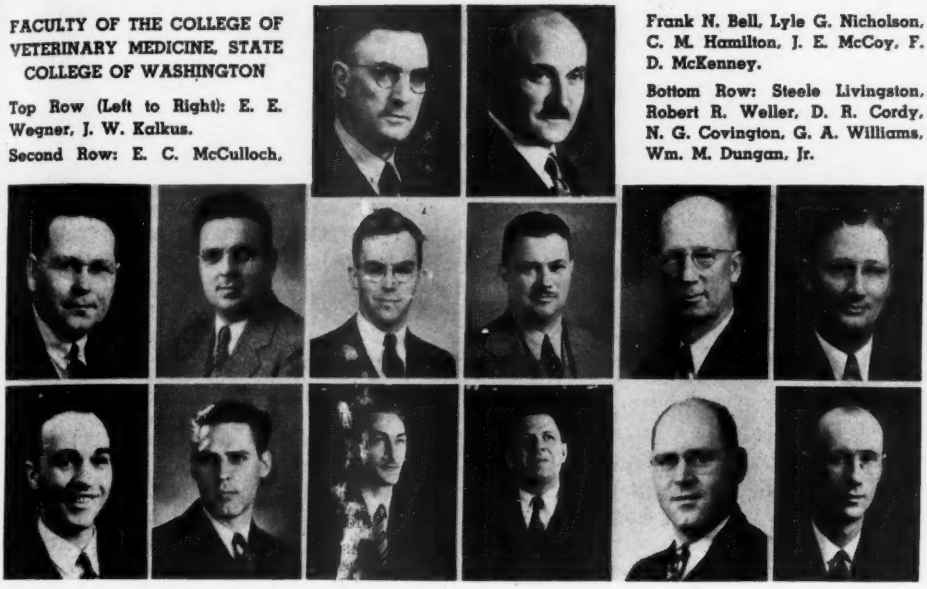
Prescriptions

When the new Federal Food, Drug and Cosmetic Act was enacted, many doubted its effectiveness. Similar consideration was given to the Wheeler-Lea Amendment to the Federal Trade Commission Act, which became a law at about the same time. Now some figures have become available which seem to indicate clearly that such legislation is having a desirable effect. The *American Journal of Pharmacy* for January, 1941, contains an item under the title "The Nation Takes Its Medicine," noting that prescription drugs and medicines showed an increase of $36,000,000 for 1939 over 1937 and that "patent" and proprietary medicine for public sale decreased $18,000,000 in value in the same period.—*J. A. M. A.*

FACULTY OF THE COLLEGE OF VETERINARY MEDICINE, STATE COLLEGE OF WASHINGTON

Top Row (Left to Right): E. E. Wegner, J. W. Kalkus, Frank N. Bell, Lyle G. Nicholson, C. M. Hamilton, J. E. McCoy, F. D. McKenney.

Second Row: E. C. McCulloch, Bottom Row: Steele Livingston, Robert R. Weller, D. R. Cordy, N. G. Covington, G. A. Williams, Wm. M. Dungan, Jr.



John A. Arey, dairy specialist at North Carolina State College, says that between-meals milk for industrial workers is helping speed up industrial output. A survey of 83 plants, he says, shows that where milk is served there are fewer accidents, less sickness and better physical condition among workers.—*Dairy Produce.*

Milk Pasteurization

Since disease germs are readily destroyed by well established methods of pasteurization, all milk for direct human consumption or for use in ice cream, cheese or other milk products should be pasteurized according to officially approved methods. After pasteurization the milk should be so stored and protected that it will not be contaminated. Liquid pasteurized milk should be retailed in sealed bottles.

The pasteurization of milk is a public health measure. The public should demand pasteurized milk for drinking and the use of pasteurized milk in milk products. The dairy trade should universally adopt pasteurization in the interest of public health.

There is no cogent evidence that pasteurized milk is significantly inferior nutritionally to raw milk.—*An. Rep., International Assn. of Dairy and Milk Inspectors.*

Sterilization of Paper Containers for Milk

A recent public health report elaborates upon the method of preparing sterile paper containers for milk. Methods used for glass bottles are not applicable to those made of paper board. According to these investigations the bacterial efficiency of the paraffin-process increases considerably with comparatively small rises in temperature. A test organism when placed on a paper container and treated with paraffin for 10 seconds at 180°F. showed a 99% reduction; for the same percentage reduction it required 35 seconds at 170°F. and four minutes at 160°F. Unless the immersion period is considerably prolonged, use of the higher temperature is recommended if the paraffin process is to provide bacterial treatment for the surfaces of the paper containers. There is a possibility that it may be necessary to subject the containers to separate bactericidal and waterproofing treatments. A manufacturer of paper containers in this country has supported a fellowship at one university for research on paper containers and, at another, for the study of the bactericidal effect of hot paraffin.

"Dogs of War"

The war office of Great Britain has invited dog owners to lend their dogs to the Army. Intelligence and natural ability will be the deciding factor in the selection of the animals to be used. Dogs selected are to be given an intensive course of training. Those qualifying will be retained for the duration of the war. The War Dog Training School is at Willems Barracks.

In Germany all dogs, more than 20 inches tall, are reported to have been conscripted for military service. Such dogs must be registered by their owners. If a dog is then taken by the government the owner is compensated.

Veterinary Military History recalls that "more than 10,000 dogs were used by France during the latter months of fighting in World War I, of which more than 5000 were wounded during one year, but so carefully were they treated (by the Veterinary Corps) that 4,196 were returned to work in their respective fields for the army.

"Germany advanced into France with 6000 trained dogs in World War I. The Italian Army had 3000 trained dogs when it joined the Allies. Early in the war the British Army established The War Dog School (the same that is in use today). Early in the conflict the War Dog Service of France was abolished. Later it was reestablished as an independent service—the "Service des Chiens de Guerre"—which developed to one of considerable importance. Belgium had the most complete dog transport service during the war because that art had been developed for several centuries in civil life. The American Army, of course, had no official dogs in the military service. The usefulness of a special dog service is shown by the fact that all foreign armies augmented them as the war grew older. Approximately 16,000 dogs attached to the German army lost their lives during the World War. This is nothing new, for since remote periods of the Middle Ages, when battles were fought hand to hand, up to modern times, dogs, shielded and armed, were arrayed with the combat troops. In this capacity they went out of use with the coming of gun powder and the intensive use of small arms, but only to return in auxiliary roles, aiding in the transport of food and ammunition, assisting sentries and patrols, giving alarms and carrying military messages. . . . The first law, relating to dogs, enacted in the American Colonies had a military reason for its enactment."

* * * *

The names of Veterinary Surgeons registered in England in 1941 have recently been published. The number registered is 3,855, an increase of 310 over that of 1937. Just six of the "Existing [non-graduate] Practitioners" of 1881 are still on the registry.

* * * *

Serious outbreaks of foot-and-mouth disease which have occurred recently, in Ireland, Scotland and the north of England, have been considerately reduced and conditions greatly improved so that restrictions in the movement of live stock have been much modified.

* * * *

The appointment of an "Agricultural Improvement Council" has been made by the English Ministry of Agriculture. Its purpose is to devise methods for seeing that promising results of research are applied as rapidly as possible to the problems of agriculture and that they are incorporated in ordinary farming practice; also to advise from time to time concerning agricultural problems which appear to require scientific investigation. This is a wise procedure at any time and should prove of unusual value now. Science is often said to be a score of years ahead of its application in this country.

* * * *

Identification of Sheep by Noseprints

An infallible method of identifying merino sheep by their noseprints has been tested in a South African research station. The method is similar to that which has been developed for dogs. The problem of identifying merino sheep has always been puzzling. There have been instances on record where the identity of certain valuable stud animals could not be legally established.—*Farmer and Stock Breeder.*

Hens Need Vitamin K

Two years of investigation have shown clearly that breeding hens must be fed rations containing vitamin K if their newly-hatched chicks are to have blood with normal clotting power.

The best natural sources of vitamin K are green grass, alfalfa leaf meal, and dried cereal grass. Alfalfa was often used in good poultry rations long before anyone knew about vitamin K, and dried cereal grass now is used in some commercial feeds. Indications are that dried cereal grass is about twice as rich in vitamin K as alfalfa leaf meal.—*Wisc. Exp. Sta. Bul. 451.*

* * * *

In many communities adjacent to Louisville and Peoria, Ill., beef cattle are fed distillery slop. Often this slop is combined with cottonseed hulls or mixed with grain. The latter mixture produces a better finish, although molasses is used to put on the final touches on the baby beeves. A few Hereford and Shorthorn and a great many Angus cattle are thus prepared for market.

E. J. Wilford of the Kentucky experiment station, through research as to the value of distillery slop for hogs, clearly demonstrated that this slop should be supplemented with a starchy food, such as corn, in a ratio of not less than one bushel of corn to 50 gallons of slop. This slop should be allowed to settle for several hours and only the thicker portions be fed to hogs.

* * * *

Marginal Nutritional Deficiencies

The milder degrees of nutritional deficiency, although they are neither fatal nor completely incapacitating, constitute the nub of the problem of malnutrition. They wreck courage. They undermine the will to do. They interfere with sleep, so that rest is disturbed. They seriously depress resistance to other diseases, and in women contribute to the occurrence of complications during pregnancy. The prevalence of milder degrees of malnutrition, in the opinion of those who are best informed, accounts for much of the shiftlessness of the poor whites of the South, and for a considerable part of the relief rolls. The undernourished are unable to hold jobs if they find them; they become unemployable.—*R. M. Wilder.*

This cow, contentedly munching an empty carton at the rear of a grocery store, is one of several cattle which until very recently were permitted to roam the streets of Kodiak, Alaska. They systematically cleaned up all the paper, cardboard boxes and cartons discarded by the homes or stores and ate all the garbage too. This has gone on for years and none of the cattle seemed to suffer any inconvenience from this unusual diet. Just recently the village has been incorporated and stock owners are required to keep their animals out of the streets and alleys. Now the taxpayers will have to pay for the clearing of waste paper, garbage and other refuse.—EARL F. GRAVES, Palmer, Alaska

Salt Prevents Some Types of Cannibalism

Pullets and hens can be cured of the feather-picking habit by including plenty of salt in their rations, according to J. G. Halpin and C. E. Holmes of the University of Wisconsin.

Whether salt will prevent all types of cannibalism is not certain, but since feather-picking usually is the first stage, it seems very likely that salt will prevent most trouble with adult birds.

The "salt water cure" consistently has stopped cannibalism in chickens, as well as in several lots of young turkeys and pheasants, in trials at the University of Wisconsin. A great many farmers also report favorable results.

Feeding salt in the drinking water is a temporary expedient, however. In the long run the practical way to get salt into the rations of chickens is to mix it in the mash.

The best information now available indicates that a poultry ration should contain at least 0.5% salt—and this means the entire ration, not just the mash. For example, if a laying ration consists of 40 parts mash and 60 parts grain, then the mash needs to carry 1¼% of salt. Also, if chicks are started on an all-mash ration containing the minimum amount of salt, it is important to increase the salt content of the mash when the chicks begin getting grain, according to these Wisconsin authorities.

Nutritional Value of Egg Yolk Powder

One hundred grams of egg yolk powder was fed to 10 patients, eight with rheumatoid arthritis and two with chronic nephritis without edema, from four to 16 weeks, with an average of 7.7 weeks. A gain in body weight varying from five to 16 pounds occurred in nine of the 10 persons. The average increase in weight for the group was 9-3/5 pounds. During an initial control period none of the patients gained; six actually suffered a loss varying from one-quarter to 4 pounds. It is concluded that egg yolk powder is an economical agent for increasing the nutrition of the body and is, in addition, a rich food source of vitamins A and D and the water-soluble fraction of the vitamin B complex.—*Alfred Steiner* in *J. A. M. A.*

Thiamin Triples the Growth of Pigs

"Pigs is *not* Pigs"—that is, they do not exhibit their well known proclivities of being "hoggish"—unless they have a proper quota of thiamin (vitamin B_1). This was made evident when N. R. Ellis, nutrition expert of the U. S. Department of Agriculture experimental farm at Beltsville, Md., fed part of a litter of pigs a synthetic diet, rich in fat but without thiamin, and the rest of the litter a diet low in fat but well supplied with thiamin. Those pigs not receiving thiamin at first gained, but soon lost weight, developed bad hearts, ran subnormal temperatures, became weak and died. Their appetites failed soon after they became sick. Mr. Ellis thinks that this confirms the view that thiamin is involved in the use of fat by the body. The other pigs of the same litter, that were fed thiamin in their low-fat diet, grew rapidly and healthily, in a short time becoming three times as large as the pigs which had no thiamin—a case of "this little pig had thiamin, this little pig had none."

The Beltville experimenters hope to reduce infant mortality in pigs by developing a diet which has in it the right amount of thiamin to cause not only regular but increased growth and also the production of a better quality of meat.

Thiamin Deficiency in Foxes and Fish

Allowed to overindulge in a diet of raw fish, both foxes and fish were observed to develop spontaneously a disease identical with the alcoholic disease caused in man by lack of thiamin (vitamin B_1), was reported at the meeting of the American Neurological Association at Atlantic City. Dr. Leo Alexander, of Boston, and his associates, Drs. Robert G. Green, C. A. Evans and Louis E. Wolf, stated that both the foxes and the fish can be cured of their trouble by the vitamin.

The human disease, known as Wernicke's disease, has been produced experimentally in animals by Dr. Alexander and other colleagues when they fed them a diet deficient in vitamin B_1, but over-abundant in other vitamins, particularly riboflavin, nicotine acid or vitamins A and D. The excess of the other vitamins, they concluded, had so raised the vitamin B_1 needs that the resulting deficiency was greater than it would have been otherwise.

What happens to the blood chemistry in thiamin deficiency or Wernicke's disease, was described to the meeting by another group: Drs. Herman Wortis, Norman Jolliffe, Martin H. Stein and Ernest Bueding. In both these conditions, the blood's pyruvic acid is invariably increased.

When normal individuals are fed glucose, the blood pyruvate is increased, but returns to normal within three hours. In Wernicke's disease this increase is very high and the return to normal is delayed. Feeding thiamin to the patient brings the blood chemistry back toward normal. Although Wernicke's disease is always associated with lack of thiamin, these observations indicate that it is also due to lack of other nutritive essentials.—*Marjorie Van de Water* in *Science*.

Correction

A statement on page 399 of the August issue conveyed an erroneous implication with respect to the membership of the National Association of Bureau of Animal Industry Veterinarians. As of November 30, 1940, that association had 1,202 active members.

The Indianapolis Meeting of the A.V.M.A.

THE 78th annual meeting of the American Veterinary Medical Association, held in Indianapolis August 11-15, 1941, continued the organization's tradition of successful meetings. The total registration, 1,946, lacked only 36 of attaining the record set at the Washington meeting last year. The attendance of 1,209 at the annual banquet conferred upon that event the distinction of being the largest veterinary banquet ever held.

The facilities of the Murat Temple and Shrine Theater were more than adequate for the exhibits and sessions of the association; the Scottish Rite Cathedral provided a beautiful setting for the annual banquet; and the scientific program, the exhibits, and the entertainment features were all excellent of their kind.

H. W. Jakeman, Boston, was installed as president for the year 1941-42. W. W. Dimock, Lexington, Ky., was chosen president-elect. S. E. Hershey, Charleston, W. Va., Jacob Traum, Berkeley, Calif., Mason Weadon, Washington, D. C., B. T. Simms, Auburn, Ala., and Wm. Moynihan, Toronto, Ont., were elected first to fifth vice-presidents in the order given.

O. V. Brumley, Columbus, O., is the new chairman of the executive board. J. G. Hardenbergh, Chicago, continues as executive secretary, M. Jacob as treasurer, and L. A. Merillat and Doctor Hardenbergh as editors of the association's publications.

The Twelfth International Veterinary Congress prize was awarded to Adolph Eichhorn, Director of the Bureau of Animal Industry Animal Disease Station at Beltsville, Md. The citation is given elsewhere in this issue.

St. Louis was selected for the 1943 meeting. As decided last year, the 1942 meeting will be held in San Francisco.

A keynote of veterinary cooperation in the national defense effort and of Pan-American unity was sounded by the speakers at the opening session and echoed by others throughout the program. The important functions of the army veterinary corps and the role of the veterinary profession in conserving the nation's food supply were emphasized repeatedly.

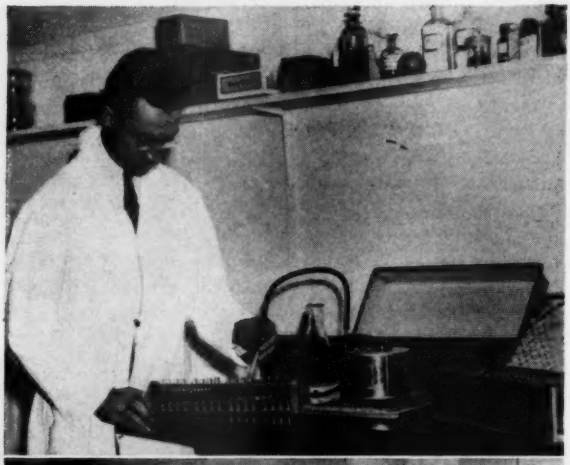
The close friendship between the veterinary profession of Canada and that of the United States was stressed by A. E. Cameron, Veterinary Director General of the Dominion of Canada, in his response to the address of welcome by Gov. Henry F. Schricker of Indiana.

W. W. Dimock, the new president-elect (right), and Cliff Carpenter discuss the relative importance of the equine and poultry industries

In his opening address, A. E. Wight, retiring president of the A. V. M. A., suggested that a Pan-American Veterinary Congress be held in connection with the 1943 meeting of the association, in order that veterinarians from all nations of the New World might arrive at a clearer understanding of their common aims and obligations.

A desirable feature of the meeting was the distribution on the first day of a pamphlet containing brief abstracts of a majority of the papers presented on the scientific program. At future meetings, this policy could well be extended to include advance publication of committee reports, permitting members of the House of Representatives to familiarize themselves with many of the matters on which they are required to vote, and allowing the membership at large to be aware of such matters before action is taken on them.

Inside the Veterinary Laboratory



Dr. E. R. Doll, using an automatic pipetting device, is filling Wassermann tubes preparatory to making the tube agglutination test for bovine brucellosis

A visitor, Dr. J. W. Patton, watches Dr. H. H. Ruhland, Animal Pathologist of the State Department of Agriculture, embed a specimen of tumor for sectioning and histopathological diagnosis

Dr. J. H. Steele (a senior student at the time the picture was taken) is stirring and centrifuging blood samples to separate the serum from the erythrocytes—a step which adds to the accuracy of the agglutination test for brucellosis

At Michigan State College

The adjoining illustrations show portions of three rooms in the animal pathology laboratory of the Michigan State Department of Agriculture, which is operated in connection with the Division of Veterinary Science, Michigan State College, East Lansing, Mich.

The pathological and bacteriological laboratory of the State Department of Agriculture is located at Michigan State College, due to an arrangement made in 1927. This close association with the Pathology Department of the Veterinary Division and Experiment Station at the Michigan State College results in mutual benefit. The department furnishes office and laboratory space for the state pathologist of the Department of Agriculture, who in turn supervises the testing of blood samples forwarded to this department in connection with the extension project on the control of Bang's disease. The amount of material for class instruction in the college is greatly increased by this arrangement, since all autopsy subjects and diseased animal tissues forwarded to the state pathologist are available to the staff and students in pathology.

This laboratory is maintained as a diagnostic aid to veterinarians in cases requiring special technic. Histopathological examinations are made of meat and meat products for adulteration, of tumors for malignancy, and of tissues for pathological lesions. Specific infective agents are isolated and identified; clinical pathology, bacteriology and animal inoculations, as well as serological tests are employed to identify atypical and obscure diseases. Cooperative work is being done with the Department of Health, the Departments of Entomology, Botany and Bacteriology and with the State Chemical Laboratories in connection with trichinosis, rabies, food poisonings, chemical poisonings and the transmission of infectious diseases.

■ The illustration at the top shows E. R. Doll filling Wassermann tubes preparatory to making slow or tube agglutination tests for bovine brucellosis. An automatic pipetting device is being used. It saves a great deal of time in filling the tubes since it discharges at a single ejection just the desired amount of antigen. The ejections are made so rapidly that it requires considerable practice and skill to move the hose from tube to tube fast enough to avoid spilling the solution.

About 400 blood samples, for testing, are received daily from veterinary practitioners. Routine testing is by the rapid or plate method. The slow test is employed only for animals for interstate shipment as the regulations in some states still require the old slow test for animals admitted to them from other areas.

■ The illustration at the bottom of the page shows another and earlier step in making the test for brucellosis in Michigan cattle. Here Dr. J. H. Steele (then a senior student in the veterinary school) is shown as he stirs and centrifuges the blood samples to separate the serum from the red cells. This procedure saves time and gives more accurate results, especially in the slow test, since the presence of erythrocytes may interfere with the interpretation of the test or may step up the sensitization factor.

Three veterinarians and one graduate student are employed part time to run the tests and prepare the antigen. Several veterinary students are employed part time in the washing and sterilization of glassware and the preparation of media.

■ The illustration in the center shows Dr. H. H. Ruhland, Animal Pathologist of the State Department of Agriculture and head of the laboratory, embedding a specimen of tumor for sectioning and histopathological study and diagnosis. It is in this department that sausage is examined to determine whether it contains meat products which are prohibited by the Michigan pure sausage law in Grade I sausage. The interested and apparently completely satisfied onlooker in the picture is Dr. John W. Patton, a visitor.

Eichhorn Receives Highest Veterinary Honor

The Twelfth International Veterinary Congress prize, called the highest honor which can be bestowed by the veterinary profession of this country upon one of its members, was awarded this year to Dr. Adolph Eichhorn. The felicity of this selection may be judged from the resumé of his career contained in the citation read by Dr. I. A. Newsom in presenting the award, an abridged text of which is given in the caption at the right.

In accepting the award, Doctor Eichhorn said in part:

"I feel this occasion is opportune for emphasizing the advantages of living in a true democracy which accords to everyone equal rights and privileges in his chosen field of activity. Being of foreign birth, I perhaps can appreciate these advantages more than those who have been so fortunate as to receive them as their birthright. I cannot help but feel the deepest gratitude for my adopted country.

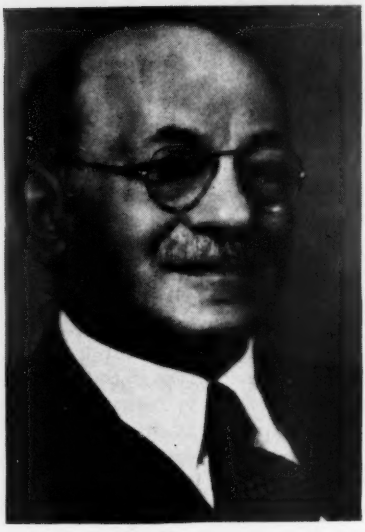
"In the 40 years since I entered the veterinary profession, I have had the opportunity of observing the advancement of the profession in the United States practically from its pioneer days. I particularly desire to emphasize the scientific progress made in our efforts to control the many scourges which have ravaged our live stock in the past—Texas fever, bovine tuberculosis, dourine, glanders, and others. We may be proud of our achievements, which have won us recognition as a profession and which in many respects have never been equaled in any part of the world.

"We should fully realize, however, that there are many problems still confronting our profession, and we should strive to continue our efforts towards solving them. Especially do I direct my remarks to our younger colleagues, since it will be through their efforts that our progress will be continued.

"I cannot refrain from paying tribute on this occasion to my friend, Dr. John R. Mohler, Chief of the Bureau of Animal Industry, who since the early days of my career has inspired me by his devotion to the profession and his constant aim for its advancement. It is to him I owe my greatest debt of gratitude.

"I thank you from the bottom of my heart for this great honor, which I shall cherish as the greatest recognition which may come to any member of our profession."

The presentation was made August 12th at the opening ceremony of the 78th annual meeting of the A.V.M.A.



ADOLPH EICHHORN

Adolph Eichhorn was born at Lipto Szt., Miklos, Hungary, May 27, 1875. He attended the Royal Veterinary College of Budapest from 1892 to 1895, when he emigrated to the United States. After graduating from the New York Veterinary College in 1900, he became associated with the American Veterinary College. His teaching career was continued at George Washington University in 1910-11, and at New York University from 1917 to 1921.

Doctor Eichhorn's most outstanding service has been with the federal Bureau of Animal Industry, which he entered as a meat inspector March 25, 1901. He was transferred to the Pathological Division in 1906, being appointed chief bacteriologist in 1914 and chief of the division in 1915. In 1917 he resigned to become director of the Veterinary Department of the Lederle Laboratories at Pearl River, N. Y., reëntering the Bureau 21 years later as Director of the Animal Disease Station at Beltsville, Md.

His career in the public service has been marked by many contributions to veterinary literature. In collaboration with Dr. John R. Mohler, he was responsible for the translation of Hutyra and Marek's *Special Pathology and Therapeutics*, Edelman's *Meat Hygiene*, Ernst's *Milk Hygiene*, and Malkmus' *Clinical Diagnosis*.

He introduced into this country the Laidlaw-Dunkin method for the control of canine distemper, and is credited with suggesting the relationship between canine distemper, swine influenza, and human influenza viruses.

His ability to converse in almost any language has made him popular throughout the world He holds honorary membership in many foreign veterinary organizations, and throughout his professional life has been a member of the A. V. M. A.

Adolph Eichhorn is a living example of the opportunity which America gives to young men of foreign birth. Friend, scholar, scientist, he is a world citizen and, as such, the appropriate recipient of the 12th International Veterinary Congress prize.

Salt in the Treatment of Enteritis in Swine

The "salt" treatment for enteric diseases of swine, particularly for "necro" and hemorrhagic dysentery or, as it is more commonly called, bloody diarrhea, continues to attract attention among Iowa veterinarians and to provoke discussion at their meetings, clinics and other gatherings.

There is little agreement as to the value of the large amount of salt the animals are induced to ingest as a prophylactic and curative measure for enteric infections. Many, probably a large majority, have declined to employ the "salt" treatment on the ground that it is purely empirical, if not in fact, nonsensical. Others, having tried it, consider it harmful. Still others, and their number is not large, have used it on from a few to several herds, with highly satisfactory results. They explain the failures their confrères have experienced in its use on the ground of faulty technic.

Not even the most enthusiastic advocate of the "salt" treatment can offer a convincing reason why the ingestion of three or four ounces of sodium chloride daily should soothe and bring about the healing of an intestinal mucosa so highly inflamed as to be bleeding copiously. Possibly the hypothesis as to the action of the salt, that is accepted by the largest number, is that it changes the pH of the intestinal contents and thus renders the intestinal wall an unfavorable site for the growth of the organisms which are doing the damage. Another is that the salt restores the mineral balance of the blood and tissues, which have been depleted of sodium and perhaps other minerals as a result of the diarrhea, an inadequate ration, infection or other causes. It would seem the truth or falsity of these assumptions would not be difficult to determine, but to date the problem appears not to have attracted the interest of research workers. This lack of interest is probably based on the premise that the treatment has not yet attained an acceptance that justifies scientific investigation, contrary as it appears to recognized principles of therapy. Possibly the effect of the salt treatment in swine enteritis is incapable of scientific explanation. That it is an empiric treatment, if such it be, in no way invalidates observations as to its value.

View of Brock Farm, where "salt" treatment for enteritis in swine originated

Swine raisers in the Corn Belt have suffered heavy losses for a score of years from enteric ailments of pigs from weaning time until they are of feeder age and older. The loss is due principally to the failure to grow and gain in weight as profitable animals must do, except in post vaccination flare-ups, which are often accompanied by heavy mortality. Infrequently is the enteritis alone a cause of considerable mortality, except in outbreaks of hemorrhagic dysentery, in which losses usually run high—25% to 60% of the animals in affected herds. All along these losses have been greatest in Iowa and the Corn Belt states. Districts as remote as Ohio or Oklahoma have suffered less by comparison. Until a few years ago enteritis in swine was usually a chronic ailment, and apparently many different organisms of the barnyard variety were involved. Since necrosis of areas of the intestinal mucosa was a common terminal stage of the ailment (the stage at which necropsies were usually held) it was generally called necrotic enteritis or "necro" for want of a more descriptive term, the definite etiology being unknown.

Following the severe droughts of 1934 and 1936 in the Missouri Valley territory the ailment became much aggravated either by an exacerbation of the infections previously experienced or by the addition of some new ones, which resulted in two types of acute diarrhea, both accompanied by a high mortality rate. At first, these new phases were thought to grow out of the poor quality of feed on which the animals

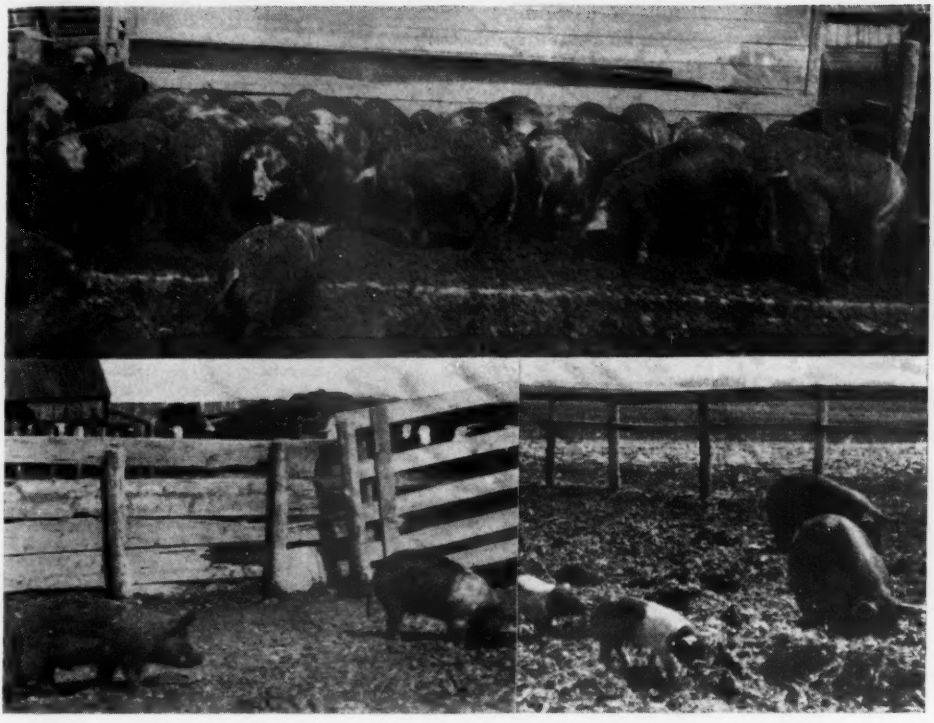
were forced to subsist—to be basically due to malnutrition, or perhaps to a vitamin A or a vitamin B deficiency, or both. However, one of these diarrheas, now called hemorrhagic dysentery, persisted after the animals were again supplied a good ration. This condition is now regarded as being the third most important disease of swine in northwest Iowa, the other two being hog cholera and swine erysipelas. As the distance from the center of origin increases, the prevalence of this bloody dysentery decreases, but it occurs all over and beyond the Corn Belt. Throughout the state of Iowa and in the surrounding states, it is a cause of grave losses to swine raisers and feeders.

The reason for the greater prevalence and severity of enteric ailments of swine in this region is probably due in part to the swine husbandry practices, and in part to climatic factors. It is a section of intensive swine production, with community sales in nearly every town and an active interchange of animals between farms and between farmers and feeders. The climate is such that for several weeks or months of the year every hog lot is a pool of mud; in fact, the whole section is a sea of mud, and anything approaching ideal sanitary surroundings for the swine is impracticable, particularly where the animals follow feeder cattle. However, the common experience among practitioners leads to the opinion that a faulty ration is more frequently a predisposing factor in the occurrence of enteritis in swine than is insanitary environment.

Enteritis has been regarded as a somewhat seasonal disease, since generally losses from it have been heaviest in the fall and early winter; however, serious losses occurred every month during the period from June, 1939, to June, 1940. This wave of the disease was followed by a fairly uniform reduction in the prevalence till by the early spring of 1941 it was, by comparison with a year earlier, almost nonexistent; at least in the form of hemorrhagic dysentery. The reason for this subsidence is unexplained. Outbreaks are again on the increase.

Alkaline solutions, or feeding oats soaked in alkaline solutions, and improvement of the sanitary conditions under which the animals are kept, has long been the standard treatment for enteritis in swine and is still the most popular treatment for this condition. However, it leaves a good deal to be desired. The results are far from uniform. In the majority of cases the alkaline treatment has been beneficial. In many it has seemed not to influence the course of the ailment and this is most likely to be the case where the sanitation is bad and improvement in this respect is impracticable. Such herds are often among the largest and most severely affected. In other words, in the herds where an effective treatment is most needed, the alkaline treatment is the most likely to be disappointing.

So far as the matter is of record, large quantities of salt were first used in the treatment of swine enteritis on what is known locally as the Brock farm near Renwick, Iowa. Its use was commenced there six years ago and has been continued down to the present season. Each year 1500 to 2000 hogs have been fed out on this farm. They follow fattening steers and in addition to what they pick up are fed corn and oats and have access to mineral mixtures in a self feeder. Prior to giving the affected hogs salt and buttermilk the loss on this farm from necrotic enteritis, and later from bloody diarrhea also, was heavy—so heavy that the owner thinks he lost money on all his hog-feeding operations. In the past six years the loss from enteric and other diseases has been almost nil. The records of hog feeding operations are rather meagre on this farm, but the number of animals put into the feed lots and the number marketed are definitely known. A lot of 450 fed out last year may be taken as typical. There were two outbreaks of hemorrhagic dysentery during May, affecting altogether 50 or more animals. In each instance the whole herd was put on salt and buttermilk immediately and but two hogs died. The number marketed from this lot was 433. The caretaker knows that some of the remainder were killed by feed trucks and he thinks it probable that all of the 15 unaccounted for were killed in this way or by other violence. Two mules kept in the lots may have been responsible for some deaths. If any (except the two mentioned) died of bloody diarrhea, he did not observe them.



THREE VIEWS ON THE BROCK FARM

Note at the top a concrete feeding floor on which two to four inches of barnyard filth has accumulated. To get to it the pigs had to wade above their hocks in similar material. The views at the bottom show pigs eating with their snouts buried to their eyes.

Noble and Edwards, live stock commission merchants of Sioux City and owners of the Brock farm, feed 2,000 hogs a year in their private yards adjacent to the Sioux City stock yards. These hogs are fed the corn swept up in the public yards after the butcher hogs have had their fill immediately before they are weighed for slaughter. It will be seen they thus have every possible chance to pick up infection. Noble and Edwards have used the buttermilk and salt treatment for five years and have had practically no loss from enteritis. Before adopting this plan their losses were heavy year after year.

Both of these trials of the treatment, extending over six and five years, respectively, constitute severe tests. It will be seen that the method of feeding followed in these yards at Sioux City invites every infection to which hog-flesh is heir. The conditions at the Brock farm could hardly be more insanitary if it were deliberately planned to make them so. The accompanying illustrations show their condition last March when all over the many lots there was a layer of thin mud and manure from six to sixteen inches deep. When the hogs walked about in the lots their bellies dragged in the filth. When they were eating after the steers their snouts were buried to their eyes or deeper. Yet throughout the feeding period they made good gains although "breaks" of hemorrhagic dysentery occurred from time to time. Following removal of the animals from the cattle feed lots and giving them salt and buttermilk the diarrhea subsided at once with few or no deaths and the recovered animals were put back with the feeder steers. Illustrations of conditions such as these do not increase the appetite for pork chops and on this ac-

count they are regretfully used. However, they are essential to an understanding of the insanitary environment of this herd and therefore to an appreciation of the difficulty encountered in controlling enteric disease in it.

Dr. John S. Koen, assigned to swine disease control for the B. A. I. in western Iowa, stated at a meeting of the Eastern Iowa Veterinary Association last fall:

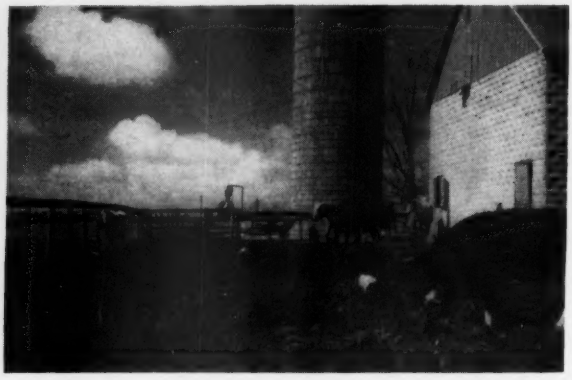
"Fifty or more veterinarians who have tried the 'salt' treatment, have reported better results following its use than from any other treatment they have employed. Some are enthusiastic concerning it. Whenever salt has been used as a treatment for hemorrhagic dysentery and has had a fair trial, it has given consistently better results than has any other treatment I have observed.

"Some have reported 'salt poisoning' from the use of the salt treatment for swine enteritis; but in every instance where any considerable loss has been reported, it has been found, on investigation, that adequate water had not been supplied. Wherever the hogs have had access to all the fresh water they would drink there has been no salt poisoning."

Doctor Koen further stated: "I have endeavored to arrange with several veterinarians and herd owners to give the 'salt' treatment a trial along with the use of alkaline solutions or other treatments in the same herds. That is, attempt controlled experimental treatments on same farms under identical conditions. In perhaps a dozen herds such experiments have been started, but in every instance the owner of the herd has discontinued all but the 'salt' treatment after a few days, thus spoiling the experiment but, in his opinion, saving the swine."

Dr. H. E. Pinkerton, superintendent of the serum plant of the Fort Dodge Laboratories, discussed swine enteritis at the annual meeting of the Indiana Veterinary Medical Association last winter and endorsed this treatment, saying in part:[1]

"In acute enteritis we have quick and marked dehydration, a toxic cell engorgement, circulatory stasis, increased permeability of capillaries, edema of tissues, destruction of epithelial cells, and passage of blood into the intestine. Remedial action should be directed to (1) removal of neutralization of toxic accumulation in digestive tract; (2) restoration of body fluid and salts. We have found sodium bicarbonate to be an excellent agent to accomplish the first purpose, and sodium chloride to bring about the second. According to Davidson, adrenal cortex extract has been found to be of value as supportive treatment in gastroenteritis—and in other debilitating diseases where dehydration may occur. Anders recommends the use of Ringer's solution—composed of sodium chloride, potassium chloride, calcium chloride and sodium bicarbonate — in treatment of dehydration of dogs. It must be remembered that there are many things which can cause digestive dis-



A couple of mules help to break the monotony for the swine, which, because their legs are shorter, experience considerable difficulty in avoiding the playful attentions of the mules

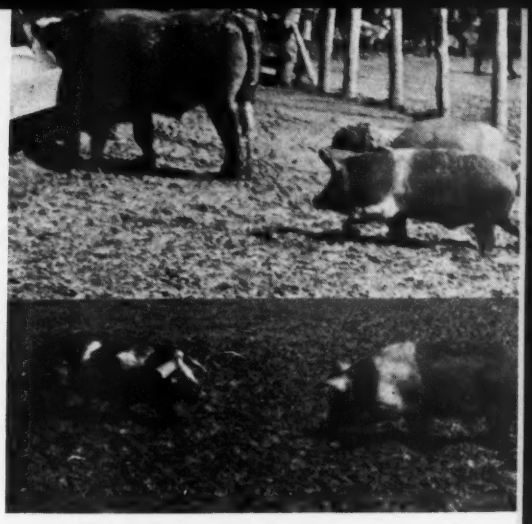
[1] Address at the Annual Meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 14-16, 1941.

turbances in swine, but in our experience with hogs, the most common are: (1) Improper food and (2) improper administration of food, good or bad. The cause should be determined if possible and be removed or corrected. As a treatment we have followed the practice of withholding all feed, also withholding water for several hours, and then giving one ounce of sodium bicarbonate for each pig in from a half to a gallon of water, and allowing no other drink for ten to 12 hours. Following this, we feed whole oats soaked 12 hours in a solution consisting of one gallon of sodium chloride to 15 gallons of water. We always provide abundant clean, fresh drinking water convenient to the feeding floor. If pigs are quite sick and entirely off feed they are given the salt solution to drink, or the salt is dissolved in weak buttermilk and water solution. Even when salt is given in this manner, it is still necessary to provide clean, fresh water in abundance. Our practice has been to discontinue the salt after three or four days as there is some evidence that it may cause gastric irritation if continued much longer."

Two methods of administering the salt are followed. At the Brock farm, as soon as the disease appears in any lot, all the hogs in that lot are removed from behind the cattle and penned up where no food is to be had. They are then given all the salted buttermilk they will drink for four days; then buttermilk that is not salted for three days. The buttermilk-salt treatment is then repeated for another four days. For this treatment salt is added to the buttermilk at the rate of 10 pounds to 50 gallons. An ample supply of fresh water is available at all times.

At the Sioux City yards mentioned, salt is added to buttermilk in lesser proportions, but is supplied to the hogs twice daily, as long as they remain on feed. That is, it is used as a prophylactic before the disease appears and as a continuous feeding adjunct until the hogs are marketed.

To determine the tolerance of pigs for salt, Doctor Pinkerton soaked three bushels of oats in 15 gallons of water, to which had been added 10 pounds of salt. This was fed to a group of pigs shortly after they were weaned. They ate this grain, extremely heavily laden with salt, readily for six days, when their appetites began to fail, probably indicating that their tolerance for sodium chloride had been reached.



It requires high stepping to get about in these feed lots. The hogs had learned this, but the photographer experienced considerable difficulty in "navigating" the lots

Two Iowa veterinarians (Drs. Brown and Winch) used oats soaked in this strong solution (10 pounds salt, 15 gallons water, three bushels oats) as a treatment for one lot of 80 small pigs affected with necrotic enteritis. The lot, which at first numbered 110 pigs, had been treated with alkaline solutions for 30 days, without observable benefit, but with a loss of 30. One course of treatment with the salted oats was followed by their complete recovery, saving 70 good pigs and 10 stunted by disease.

Whether this treatment will stand the test of time and wider use is unpredictable. Few who have used it have experienced the unfailing satisfaction that has followed its use on the Brock farm. It seems definitely proved, however, that this quantity of salt (perhaps two to four or even five ounces daily) is not harmful to a 100-pound shote, not even to a sick one, if it is not continued longer than a week at a time and if plenty of fresh water is readily available to the animal at all times. The hogs will not drink a sufficient quantity of water if they have to go any considerable distance for it. A hundred feet from the feed is too far away to have the fresh water.

Intravenous Chloral Anesthesia in Horses

By PROF. L. GOFFINET
Ixelles, Belgium

THE use of anesthesia in painful operations is the duty of every veterinary practitioner. Not only is it desirable from the humane standpoint and from that of surgical efficiency, but it gives the public a favorable impression of the veterinary profession as contrasted with the methods of empirics.

Thanks to Marcenac, Lemetayer, and their collaborators Pagnon and Dumas, we possess in intravenous chloralization a method of anesthetizing horses which is practical, rapid, efficacious, and economical.

Dose

The dose recommended by Marcenac is very satisfactory. It is 11 grams of pure chloral hydrate (Merck) per hundred kilograms of body weight. Designating by "W" the weight of the horse in kilograms, the quantity of chloral to be used is deduced from the formula $C = \frac{W \times 11}{100}$; thus, for a horse weighing 500kg (1100 lbs.), $\frac{500 \times 11}{100}$ = 55gm (the dose of chloral hydrate). Citrate of soda is then added at the rate of 50% of the weight of chloral, up to 30 grams. To make a 20% solution, the volume of water added is C × 5, and one gram of sodium chloride per 125cc of water is added to this to make an isotonic solution. The preparation indicated for an animal weigh-500kg is therefore: 55gm of chloral; 22.5gm of citrate of soda; 2gm of sodium chloride, dissolved in 275cc of lukewarm, distilled water. Dissolve the chloral hydrate in the lukewarm physiological salt solution; add the citrate of soda, finely powdered, and filter through cotton.

This solution should always be made up fresh for use.

Equipment

At this concentration, the anesthetic solution is irritating for cellular tissue, and the injection must be strictly intravascular. Use a narrow, lance-shaped trocar into which can be slipped a hollow needle which extends a little beyond the trocar, ending in a blunt tip with a small lateral opening. The other end of this needle is joined to a piece of rubber tubing with a section of glass set in at one point; the rubber tube, about five feet long, is attached to the funnel or bottle containing the fluid to be injected.

A garrote with a wooden ball is used to obtain distention of the blood vessel by pressure on the jugular vein.

Technic of Injection

An hour before the operation, the apparatus is filled with carbolic acid to clean and disinfect the interior. When it is to be used, the antiseptic is removed and replaced with the anesthetic liquid; the apparatus, emptied of air, is then ready for use.

The horse is placed, standing, next to the spot where it is desired that it fall, with a twitch on its nostrils and the restraining cords in place but not tightened. After placing the constricting cord around the neck, the operator disinfects the jugular region with ether and marks the distended blood vessel. The trocar with cannula is then thrust into the jugular vein and pushed deeply into it, so that it lies parallel to it and directed toward the head, i.e., against the flow of blood. A strong, continuous flow of blood commences, and the constricting cord is loosened. The needle is then inserted

into the cannula and fastened by a safety catch. The funnel is held about 12 inches above the site of the injection at the beginning, in order to avoid shock from the sudden inundation of the heart with the anesthetic before it has become mixed with the blood.

During the injection (three or four minutes) the horse remains quiet; there is no period of excitement. At this time assistants can tighten the restraining cords and place a casting harness on the forelegs.

Toward the end of the injection, it is possible to accelerate the flow by progressively elevating the funnel to as high as two feet above the site of injection. A slow, steady flow is assured by the small caliber of the needle. The glass section in the tubing allows one to gauge the rate of flow and to terminate the injection at the proper time. The needle is withdrawn from the trocar before the fluid is entirely injected, to avoid introducing air into the vein, and, by again compressing the vessel below the site of injection, the blood is made to flow through the trocar to remove from it the last drops of the irritating anesthetic solution. The trocar is then withdrawn and the site of injection again disinfected with ether and closed with a Michel clip.

Progress and Duration of the Anesthesia

The horse remains standing during the injection, but soon sinks to its knees and hocks and subsides onto the bed of straw which has been prepared. Anesthesia is established progressively without any excitement or pain, or excessive amount of movement. Completion of the anesthesia can be recognized by the lateral movements of the eyeballs and by the retarding of the respiratory rhythm. The animal remains lying quietly for two hours. Awakening is announced by contractions of the limbs and of the neck. The restraint is removed, the animal is placed in the sterno-abdominal position, helped to rise, and led back to its stall, where it immediately begins to munch its hay.

This method of anesthesia is used for all painful operations; castration, dental extractions, cauterization, opening fistulas of the neck and withers, various tenotomies, reduction of hernias, etc.

Uterine Torsion in the Mare

At five o'clock in the afternoon a thin 1200-pound, five-year-old, sorrel mare was brought in by the owner who said that she had been colicky and straining since seven o'clock that morning. He was in doubt as to whether she was trying to foal or had an attack of colic.

On examination the anterior part of the vagina was found to be slightly twisted and the cervix barely palpable. An onion that the farmer had placed in the anterior part of the vagina was removed. On rectal examination the left broad ligament could be felt drawn over the top of body of the uterus and the cervix.

W. L. Williams[1] states that uterine torsion is rare in the mare and is usually due to violence such a fall off a straw stack. The owner knew of no violence this mare had suffered although she had been turned out with the other horses.

She was given, intravenously, two ounces of chloral hydrate in 1000cc of water and was tied as for castration. She was then rolled to the right with a quick motion. This resulted in sufficient relaxation of the parts so that the operator was enabled to force his hand into the uterus and grasp the head of the fetus. An effort was made to hold the uterus while the mare was rolled several more times, however without much result.

Then the two front limbs were straightened from beneath the fetus and brought into the vagina to the vulva. Chains were placed on the feet to hold them and the mare was given one more roll which completely overcame the torsion; the head was then straightened out and traction applied to it and the feet. A large mule colt, which was dead, was delivered without difficulty.

The mare was given 1000cc of saline solution intravenously. She delivered the afterbirth during the following night. The next day the uterus was examined and one pint of bipp was pumped into it. The mare remained in the hospital for several days and made an uneventful recovery.

DON WHITNEY

Phillipsburg, Kans.

[1] The Diseases of the Genital Organs of Domestic Animals, Second Edition, Page 455.

Comparison of the Efficacy of Phenothiazine And Copper Sulphate-Nicotine Sulphate Mixture As Anthelmintics for Sheep

By D. A. SHORB and R. T. HABERMANN and L. C. HEEMSTRA

Zoological Division — Animal Husbandry Division
Bureau of Animal Industry, U. S. Department of Agriculture
Beltsville, Maryland

FOR YEARS copper sulphate alone or copper sulphate combined with nicotine sulphate has been a standard treatment for the removal of gastrointestinal worms from sheep, these drugs having been considered especially efficacious against the common stomach worm, *Haemonchus contortus*. Recently phenothiazine has been introduced as an anthelmintic of promise for removing stomach worms and other worms from sheep. However, the comparative efficacy of phenothiazine and the other two treatments, when used for different members of the same flock of sheep maintained under identical conditions, has been given but little study. An opportunity for making such a study recently presented itself, and the results of this investigation are given in this paper.

Materials and Methods

Naturally-parasitized spring lambs belonging to the Animal Husbandry Division of the Bureau of Animal Industry, Beltsville, Maryland, were divided into two groups, group "A" consisting of 85 females and group "B" of 30 males. The two groups were kept on approximately equal pasturage and otherwise were managed in as nearly identical a manner as possible. Each lamb in group "A" received the regular copper sulphate-nicotine sulphate treatment, consisting of 90cc of a mixture containing 0.9gm of copper sulphate and 0.9cc of a 40% solution of nicotine sulphate, given as a drench. The lambs in group "B" received 25gm of commercial phenothiazine by capsule. All animals were weighed and hemoglobin determinations were made both before and after treatment, but insofar as these data were concerned there was no significant difference between the two groups. The lambs of the two groups were raised together until shortly before this experiment started, when it became necessary because of maturity to separate the sexes. The difference in size of the two groups is accounted for by the fact that by fall, when this experiment was started, many of the ram lambs had been either sold or slaughtered, while the ewe lambs were retained for possible flock replacements.

Fecal examinations were used as a means of determining the kinds of worms harbored by the sheep, and the number of eggs found before and after treatment was used as an indication of the relative efficacy of the treatment. Ten lambs from each group were selected as a representative sample. For the purpose of making these examinations feces were collected directly from the rectum. One fecal pellet of each sample was placed in a centrifuge tube with water, thoroughly broken up, centrifuged, and the supernatant liquid poured off. Saturated salt solution was added to fill the tube to the top, and a coverglass was then placed on the tube. The tube was again centrifuged, the coverglass removed to a microscope slide, and the eggs on it were identified and counted. Pellets were used instead of a weighed amount of feces for the following reasons: (1) Stoll[1] showed that this method is as accurate as the use of weighed samples, if comparison is made between successive fecal samples from the same sheep and not between samples from different sheep; (2) the relative water content of the pellet may be ignored, since each sheep produces pellets of surprisingly uniform size, although there is a great differ-

[1] Stoll, Norman R., 1929. Studies with the strongyloid nematode, *Haemonchus contortus*. 1. Acquired resistance of hosts under natural reinfection conditions out-of-doors. *Amer. Jnl. Hyg.*, 10:2, pp. 384-418.

ence in the size of pellets from different sheep; (3) one fecal pellet had previously been found to be a satisfactory amount of material for use with the direct centrifugal flotation technic; (4) the use of pellets as samples is less time-consuming than the use of weighed samples—an important feature when the time available for work is limited, as in the present investigation. When the counts had been made and compared, it was found that the variation between consecutive counts was usually slight when no treatment had intervened.

Corriedale ewes in a B. A. I. experiment station flock

The first examination was made the day before the initial treatment, and subsequent examinations were made at weekly intervals. A second treatment was given six weeks after the first, using the same doses of the respective drugs. A final egg count was made one week later, when the experiment was terminated.

Experimental Data

Table I gives the results of egg counts made on individual animals in group "A" before and after the copper sulphate-nicotine sulphate treatment. Table II presents similar data for animals in group "B," treated with phenothiazine. Nematodirus, Chabertia and Trichuris were not considered in these tables because their eggs occurred in such small numbers. Table III presents a summary of the results of weekly egg counts made on 10 animals in group "A," and Table IV presents similar data for 10 animals in group "B." (One of the sheep in group "B" died of pneumonia during the fourth week so that only nine animals are included in the last three counts.)

From these data it may be seen that copper sulphate-nicotine sulphate mixture was only partially effective in removing *Haemonchus contortus* and *Ostertagia* spp., and had no effect on other nematodes present, while phenothiazine was not only more effective for the removal of these two species, but was also very efficient in the removal of *Trichostrongylus* spp., *Cooperia* spp., Bunostomum and Oesophagostomum. No conclusions can be drawn with reference to *Chabertia ovina, Trichuris ovis* and *Nematodirus* spp. because these species were present in too small numbers. Eggs of Strongyloides were present in large numbers in all sheep, both before and after treatments, showing that neither of the medicaments used was effective for the removal of this parasite.

Phenothiazine showed no effect on the tapeworm, *Moniezia expansa,* although eight of the animals under observation were infected. Although copper sulphate-nicotine sulphate mixture has been reported as an effective teniacide for the removal of this tapeworm from sheep, it was ineffective in the present tests. Two sheep were passing eggs of Moniezia at the time of the first treatment with copper sulphate-nicotine sulphate mixture and they continued to pass eggs until the second treatment. However, no tapeworm eggs were found in the feces of these animals following the second treatment. Whether or not the drug removed the tapeworms from these two animals, that had been infected for at least six weeks, was impossible to say, since the life of this parasite is short

TABLE I.—NEMATODE EGGS FOUND IN FECAL PELLETS OF 10 SHEEP IN GROUP "A" BEFORE AND AFTER TREATMENT WITH THE COPPER SULPHATE-NICOTINE SULPHATE MIXTURE

Eggs recovered (a) before and (b) after first treatment

Ewe No.	*Haemonchus contortus*		*Ostertagia spp.*		*Trichostrongylus spp.*		*Cooperia spp.*		*Bunostomum trigonocephalum*		*Oesophagostomum columbianum*	
	a	b	a	b	a	b	a	b	a	b	a	b
2	117	17	120	30	12	78	268	545	10	15	4	3
3	551	70	17	26	19	70	106	546	1	9	0	2
5	45	25	79	103	12	13	126	76	1	2	0	0
12	74	12	78	1	9	24	41	66	3	1	2	0
15	78	4	90	6	7	38	70	170	5	0	0	0
29	7	19	22	86	2	51	74	434	1	17	0	2
32	2	1	23	5	1	5	24	48	0	0	0	0
39	39	25	78	44	1	17	90	124	1	25	1	2
45	3	5	64	12	0	9	260	63	0	2	0	2
51	108	3	73	37	1	12	105	405	1	0	0	1
	Eggs recovered before and after second treatment											
2	15	10	29	9	73	58	312	368	29	5	11	3
3	39	32	34	43	10	34	43	6	58	61	3	3
5	41	1	70	11	45	50	119	27	92	146	2	1
12	24	1	28	1	48	11	88	15	30	2	2	1
15	2	0	7	0	14	22	130	79	7	9	0	3
29	18	7	22	7	24	57	232	216	21	52	2	4
32	24	1	44	7	51	13	238	110	21	0	0	1
39	84	65	81	86	85	95	454	431	22	9	4	13
45	5	4	41	17	22	29	382	502	33	4	0	0
51	18	0	35	5	20	12	347	373	8	57	0	0

TABLE II.—NEMATODE EGGS FOUND IN FECAL PELLETS OF 10 SHEEP IN GROUP "B" BEFORE AND AFTER TREATMENT WITH PHENOTHIAZINE

Eggs recovered (a) before and (b) after first treatment

Ram No.	*Haemonchus contortus*		*Ostertagia spp.*		*Trichostrongylus spp.*		*Cooperia spp.*		*Bunostomum trigonocephalum*		*Oesophagostomum columbianum*	
	a	b	a	b	a	b	a	b	a	b	a	b
4	642	2	58	3	16	0	50	0	10	0	6	0
6*	84	0	61	4	20	2	87	1	23	0	1	0
15	153	1	120	1	7	3	165	17	16	0	0	0
16	69	9	75	19	3	7	31	0	3	1	0	2
20	439	0	81	2	8	0	193	0	0	0	0	0
30	116	0	99	2	2	7	343	211	3	0	0	0
36	504	3	141	9	21	10	681	27	2	1	2	0
49	218	1	114	5	4	1	27	17	1	1	0	0
55	1,021	3	161	7	23	0	67	0	8	1	0	1
56	207	1	122	2	8	1	227	4	10	0	0	0
	Eggs recovered before and after second treatment											
4	72	0	75	0	16	0	8	0	4	0	3	0
15	71	0	9	0	24	3	96	0	0	0	6	0
16	14	0	15	6	8	2	37	0	0	1	14	0
20	8	0	10	0	11	1	40	0	17	0	0	0
30	85	0	71	0	7	0	569	18	227	9	34	0
36	302	0	131	1	30	0	166	0	19	0	3	0
49	77	0	45	0	12	4	106	45	43	10	7	0
55	3	0	19	0	4	1	7	1	21	2	1	0
56	218	0	36	5	15	0	122	32	4	5	6	0

*This animal died on November 7, 1939, between the first and second treatments so that it is not included in the second half of the table.

and the disappearance of evidence of infection may have been due to spontaneous expulsion of the worms. Tapeworm eggs were found in the feces of the third sheep on the day of the second treatment, but no eggs were found when the feces were examined a week later. Another sheep showed eggs in the feces one week after the second treatment, although no eggs had been found previously. Since this represents three possible successes, as against three definite failures, it appears that the copper sulphate-nicotine sulphate mixture treatment must be considered unsatisfactory for the removal of tapeworm from sheep.

Gordon[2] considered a 70% reduction in

[2] Gordon, H. McL., 1939. The efficiency of various concentrations of solutions of copper sulphate against *H. contortus*. *Austral. Vet. Jnl.* 15:5, pp. 216-218.

TABLE III.—AVERAGE NUMBER OF HELMINTH EGGS OF VARIOUS SPECIES FOUND IN FECAL PELLETS FROM 10 SHEEP TREATED WITH COPPER SULPHATE-NICOTINE SULPHATE MIXTURE*

Date of examination	Haemonchus	Ostertagia	Trichostrongylus	Cooperia	Nematodirus	Bunostomum	Oesophagostomum	Chabertia	Trichuris
1939									
Oct. 10	102.4	64.4	6.4	116.4	.9	2.3	.7	.4	.1
" 18	18.1	35.0	31.7	247.7	1.5	7.1	1.2	.4	.0
" 25	16.5	30.1	26.5	254.7	1.0	24.5	3.8	.8	.1
Nov. 1	11.2	23.0	27.6	286.3	1.1	5.9	1.5	.2	.1
" 8	16.5	46.0	28.7	264.0	1.1	10.1	2.0	.4	.1
" 29	27.0	39.1	39.2	234.5	.8	32.1	2.4	1.5	.0
Dec. 6	12.1	18.5	38.1	212.7	.6	34.5	2.9	.2	.8

*On October 11, and November 29, 1939, each animal was dosed with 90cc of an aqueous mixture containing 0.9gm copper sulphate and 0.9cc of a 40% solution of nicotine sulphate.

TABLE IV.—AVERAGE NUMBER OF HELMINTH EGGS OF VARIOUS SPECIES FOUND IN FECAL PELLETS FROM 10 SHEEP TREATED WITH PHENOTHIAZINE*

Date of examination	Haemonchus	Ostertagia	Trichostrongylus	Cooperia	Nematodirus	Bunostomum	Oesophagostomum	Chabertia	Trichuris
1939									
Oct. 11	345.3	103.2	11.2	187.1	2.0	7.6	.9	.4	.1
" 19	2.0	5.4	3.1	27.7	.3	.4	.3	.0	.1
" 26	2.9	14.3	13.1	61.6	.1	4.0	.9	.3	.3
Nov. 2	2.7	21.0	13.3	64.9	.2	1.3	.9	1.0	.2
" 9	22.6	34.7	15.0	78.2	.0	12.8	3.1	1.1	.9
" 30	94.4	45.5	14.1	127.7	.0	37.2	8.2	1.9	1.2
Dec. 7	0.0	1.3	1.2	10.7	.4	3.0	.0	.1	.3

*Animals treated October 12 and November 30, 1939, with 25gm commercial phenothiazine administered in a gelatin capsule. One sheep died of pneumonia November 7; no worms were present. The figures for the last three examinations include the data for the remaining nine sheep.

the egg count after treatment as an indication that the drug used was an effective anthelmintic. In the case of *Haemonchus contortus*, a reduction of this magnitude occurred in half the sheep treated with the copper sulphate-nicotine sulphate mixture. A similar reduction was obtained following 12 of the 20 treatments administered in the case of *Ostertagia* spp. (Table III). However, in some instances the number of eggs found in the feces following treatment was greater than that found in the feces from the same animal prior to treatment. The average reduction in egg count following treatment with copper sulphate-nicotine sulphate mixture was greater than 70% only in the case of the first treatment for *Haemonchus contortus* (Table I). With phenothiazine the picture is entirely different. In 19 cases treatment with this drug was satisfactory for the removal of both *H. contortus* and *Ostertagia* spp. The drug also appeared to be satisfactory for the removal of Bunostomum in all but four cases, for *Trichostrongylus* spp. in all but three cases, and for *Cooperia* and *Oesophagostomum* spp. in all but two cases.

Harwood, Habermann and Jerstad,[3] and Habermann and Harwood[4] reported on the efficacy of phenothiazine for the removal of various nematodes from the gastrointestinal tract of sheep. In the cases reported in the latter paper recrystalized phenothiazine was used and the efficacy was as follows: Bunostomum, 95%; Oesophagostomum, 84%; Chabertia, 94%; Haemon-

[3] Harwood, Paul D., Robert T. Haberman and A. C. Jerstad, 1939. Efficacy of commercial phenothiazine in the removal of roundworms of sheep. *Vet. Med.* 34:7, pp. 440-443.

[4] Habermann, Robert T. and Paul D. Harwood, 1940. Efficacy of recrystalized phenothiazine for the removal of nematodes from the gastrointestinal tract of sheep. *Vet. Med.*, 35:1, pp. 24-29.

chus, 80%, and Ostertagia 40%. However, there were many worms recovered that were so disintegrated that an identification was not attempted; it is probable that others were so completely digested that after the manipulations necessary for recovery of the worms from the feces no recognizable remains could be found.

TABLE V.—COMPARATIVE EFFICACY, BASED ON EGG COUNTS, OF PHENOTHIAZINE AND OF COPPER SULPHATE-NICOTINE SULPHATE MIXTURE FOR THE REMOVAL OF NEMATODES FROM SHEEP.

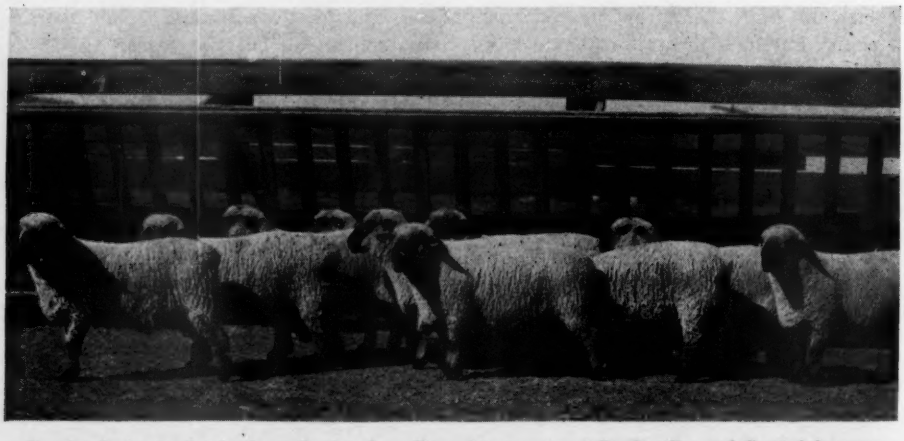
Parasite represented by eggs in feces	Reduction in egg count following treatment	
	Copper sulphate-nicotine sulphate	Phenothiazine
Haemonchus contortus	75.9%	99.5%
Ostertagia spp.	55.4	95.5
Trichostrongylus spp.	0	81.6
Cooperia spp.	0	88.0
Nematodirus spp.	0	65.0
Bunostomum trigonocephalum	0	93.9
Oesophagostomum columbianum	0	96.2
Chabertia ovina	68.4	95.2
Trichuris ovis	0	66.7

The method of evaluating the effectiveness of an anthelmintic treatment by determining the reduction in the number of worm eggs in a given quantity of feces after treatment, as compared with the number of eggs present before treatment, has the advantage of obviating the necessity of slaughtering the animal in order to obtain information on the anthelmintic value of the drug. Although it is well known that many factors affect the egg counts made on feces of animals, it is evident from the rather uniform counts shown in Tables III and IV, made when no treatment intervened, that the differences following treatment may be assumed to be due largely to the treatment itself. Table V gives a comparison of the efficiency of phenothiazine and the copper sulphate-nicotine sulphate mixture. It is evident when the figures in this table are compared with those given by Habermann and Harwood[4] that the worms which could not be identified were largely small trichostrongyles, and that if they could have been identified a greater efficacy would have been reported for Haemonchus, Ostertagia, Trichostrongylus and Cooperia following treatment with phenothiazinne.

Summary and Conclusion

1. When standard doses of phenothiazine and of copper sulphate-nicotine sulphate mixture were compared directly for their efficiency in removing helminths from the gastrointestinal tract of sheep, it was found that phenothiazine was much more effective against all worms present, except tapeworms of the genus Moniezia.

2. The egg count method, as used in connection with the experiments reported in this paper, offers a means of evaluating the anthelmintic efficacy of drugs, and may serve to correct in part the errors inherent in the critical test.



Crossbreds for market lamb production, from Hampshire rams and Rambouillet and Corriedale ewes

Paraplegia (Wobbles) in Cattle

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THE names applied to many diseases of animals are not specific, but merely indicate one or more characteristics of the disease. Wobbles in cattle is an example of this type of nomenclature. In the Dominican Republic this disease is known as derriengue (*derrengado* = wobbly). Up to the present time the etiology of the disease has been very much in dispute in this country. We wish, therefore, to enumerate observations made by us and to indicate some work done by others on the subject.

Since this disease is limited to cattle, in which it occurs at all ages and in both sexes, though more commonly in males, those diseases found elsewhere in other animals, showing much the same symptoms, such as "Mal de Caderas" in solipeds, posterior paralysis in swine, etc., may be eliminated in the differential diagnosis.

Wobbles occurs in this country only in pastures where species of the plant Zamia, known here as Gualliga or Guayiga, are found, i.e. near the southern coast. This plant belongs to the cycad family; at least two species, *Z. integrifolia or latifoliata* and *Z. media*, occur on this island. They are coarse, woody, fern-like plants with a bulbous root, and grow to a height of two to three feet. This disease (wobbles) occurs also under similar conditions in Brazil, Australia and New South Wales. The Zamia plant grows also in Florida, Cuba, Puerto Rico and a number of other tropical and subtropical countries, but no mention of the presence of the disease in countries other than those mentioned has come to my attention.

■ Upon arrival in this country several years ago I was told of a disease called "derriengue," and since have seen many cases. The first cases seen by me were in a dairy herd near Trujillo City. The herd had been recently turned into a new pasture in which there was a great deal of Zamia. Within three weeks 11 of the 35 were unsteady or wobbly *(derrengado)* in the hind legs. I was not called until a week after the first symptoms appeared. Removal of the cattle from the infested pasture was recommended, and purgatives, tonics, including nux vomica, and

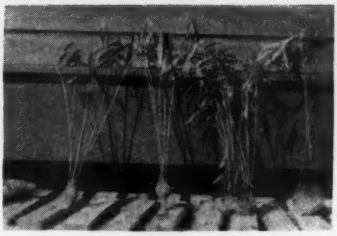

Fig. 1. Some specimens of *Zamia media*, the plant which causes wobbles (derriengue) in cattle

calcium gluconate were given to all affected animals. Two of the most recent cases recovered, but the others remained the same, or went from bad to worse, and all were disposed of. After the herd was removed from this pasture no new cases developed. Later all Zamia plants in this pasture were destroyed and cattle again turned in, with no ill effects.

As previously stated, this disease and Zamia coexist all along the southern coast of the Republic, but the greatest numbers of both have been observed on the southeastern coast, in the region of San Pedro de Marcoris. Here, too, where Zamia has been eliminated from any of the pastures, derriengue has disappeared also. However, not all cattle in pastures infested with Zamia become affected with the malady. The plant is very coarse and unpalatable and hence is eaten only when there is a great scarcity of other, more palatable feed.

■ Among the most extended writings on this subject is that of Dr. Frank Hare, who was in the Dominican Republic as veterinarian and animal husbandryman during American Army occupation here. In 1922 he stated:[1]

[1] Hare, Frank. 1922. Paralisis Zamia "Derriengue." *Revista de Agricultura* (Dominican Republic).

"The cause of Zamia paralysis lies in continued ingestion of the leaves and stems of the Zamia plants (Guayiga).

"From experiments made at the Agricultural Experiment Station, Haina, D. R., it was

Fig. 2. A zebu steer affected with "derrienque." The back is curved, the tail elevated, the hind legs well apart

observed that the animals used, zebu calves four and five months old, did not eat any appreciable amount of the Zamia during the first 10 days of feeding. It should be noted here that animals do not eat Zamia if other more palatable feed is available and only after becoming sufficiently hungry did they consume as much as 2½ pounds daily. On the 24th day the first calf began to show marked signs of partial paralysis.

"The symptoms produced are evidently caused by the continued action of some property of the Zamia plant, or the lack of some essential feed element, rather than that of some specific toxin, as the injury is permanent and does not disappear on removal of the cause.

"With the exception of some loss of flesh, a roughened dry coat, hard and dry feces, the calves appeared normal until the 20th day, when one of them presented some curvature of the spine, a slight lameness of the hind legs, and the tail slightly raised and carried to one side. This condition continued for four days, when it was noted that the calf experienced difficulty in rising and manifested marked lack of control of hind limbs, moving with an unsteady, wobbly gait and, when forced to move faster, the feet were raised unusually high and made ataxic movements. This feature was most characteristic when the animal was made to move in a circle, as in turning around. The hind feet would cross over one another until the animal would lose its equilibrium, when it would stop and the hind legs would take a saw horse attitude with the forelegs well extended to keep from falling. In this position the back would invariably curve to one side or the other. When the animal would fall and wished to rise again it would extend the front legs first, like a horse, then rise with difficulty. If it was obliged to move rapidly the fetlock joints of the hind legs would become markedly flexed; weight being sustained on the front of the hoof.

"The temperature varied little from normal and there was little appetite for feed or water.

"One interesting feature noted in the acute cases was a reddish colored urine (due no doubt to hematuria).

Fig. 3. These young bulls were affected with "derriengue" for more than a year. The bull in the center has made no improvement; the others have improved and are now in service

"Five days after the first symptoms appeared the calf was killed for necropsy.

"The arterial blood was paler than normal and the skin and general condition of the animal showed inanition. The spinal cord of the lumbar and sacral regions appeared pale and softened. This is the only characteristic lesion which we have observed in either acute or chronic cases. This no doubt explains the wobbly gait and the paraplegia.

"The disease is of a chronic nature and the prognosis, as to complete recovery, is very unfavorable. However, if the animals are not too badly affected and can secure sufficient feed they fatten like normal animals. With the exception of more or less incoördination of movement, depending upon the amount of the Zamia plant eaten, they appear healthy in all other respects.

"Our treatment of the disease has given little encouragement. A brisk purgative is indicated. It should be given as early as possible, in order to eliminate the offending material from the digestive tract. For this purpose we have used arecoline hydrobromide subcutaneously, but believe that large doses of Epsom salt would probably produce the same results.

"The affected animals, of course, should be removed as early as possible from the pasture infested with the Zamia plant.

"Theoretically strychnine is indicated; however, its use has not produced appreciable benefit.

"The disease is not transmissible; no microscopic organisms can be detected in the blood of affected animals; the disease is found only where the Zamia plant exists; and these same conditions are reported in Australia. Therefore, farmers wishing to avoid this disease should eliminate completely all Zamia plants from their pastures."

■ The toxic substance or substances in Zamia have not been determined. Of a closely-related plant, however Mann and Wallas[2] say: "We have come to the conclusion that the effects upon cattle induced by eating the *Macrozamia fraseri* are caused by the presence in the plant of acid potassium oxalate. This is in confirmation of the results of an analysis made by Mr. Norrie prior to 1876."

The toxicological action of oxalates, as given by Solis-Cohen and Githens, is as follows: "The symptoms are due to calcium deprivation and to calcium oxalate in the urine. On the one hand weakness and softening of bones suggests rickets and on the other there are renal pains and calculi in the kidney and bladder. Treatment consists in the administration of magnesium salts, which also aid in overcoming the usual constipation."

Conclusions

It seems to be well established that derriengue (paraplegia, wobbles) in cattle is due to the ingestion of the plant Zamia. It appears likely that, as in the case of *Macrozamia fraseri* (another cycadaceous plant), the toxic agent is some salt of oxalic acid in the plant. In any event, the trouble can be avoided by the elimination of Zamia from the pasture.

Treatment by active purgation has been effective when the disease is in the first stages, but once the nervous tissues have become markedly altered little hope for improvement can be entertained. However, the less severe cases often show improvement in time with good feeding.

[2] Mann and Wallas, 1906. Jnl. and Proc. of the Royal Soc. of N. S. Wales, Vol. XL.

Chondroma of the Nasal Septum

April 1, 1941, a four-year-old roan mare was presented for treatment. The owner had noticed two weeks previously that the mare was breathing with difficulty and that there was a slight discharge from the nostrils. She had been idle on pasture during the winter.

Symptoms.—Dyspnea was quite pronounced, with respiration 42 per minute. The temperature and pulse were normal. Examination of the nasal passages revealed a thickening of the anterior three inches of the nasal septum which almost prevented the passage of air.

Treatment.—An area at the junction of the upper and middle one-third of the trachea was shaved and 1% procaine injected to anesthetize the area. An incision was made and the cartilage of one tracheal ring removed to permit installation of a trachea tube. The mare was then placed in lateral recumbency on her right side. The nostril on the left side was anesthesized by injecting 1% procaine under the mucous membrane and applying procaine swabs to the mucous membrane. The thickened area was incised with a scalpel and smoothed with a curette. Cotton tampons were placed in the cavity to control hemorrhage. Next day the mare was placed on the table on her left side and the same procedure followed with respect to the right nostril. Respiration had increased to 48 per minute, but part of this condition was due to swelling in the area of the trachea tube.

Aftercare.—The trachea tube was removed each day and replaced by a sterile one after cleaning the wound with bichloride of mercury (1-500 solution). The discharge from the nostril was wiped away each day. The day following the operation the respiration had decreased to 46 per minute, and at the end of the tenth day to 32 per minute; labored breathing had ceased. The trachea tube was removed on the tenth day and the area was treated as an open wound. The mare was then returned to the owner. At present the animal breathes freely and no thickening of the nasal septum is noticeable.

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Chemical Changes in the Blood of Swine Infected with Hog Cholera

II. The Serum Bases and Whole Blood Hemoglobin and Glutathion

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IN AN earlier publication[1] on the chemical changes in the blood of swine infected with hog cholera virus, we reported a marked decrease in the serum calcium during the course of the disease. Further investigations have been conducted on this phase of the chemical pathology, including all of the serum bases.

The initial values for the serum calcium of the swine used previously were definitely low. The serum calcium of the pig is easily lowered by the dietary factors which were not controlled in our earlier work. The experiments reported here were designed to determine the effect of feeding two levels of calcium on the mineral composition of the blood serum during the course of experimentally produced hog cholera. In this investigation hemoglobin, total erythrocyte count and whole blood glutathion were also determined.

Glutathion is a tripeptide of cystin, glycin and glutamic acid which acts as a hydrogen acceptor in part of the oxidation-reduction reactions during normal metabolism. The glutathion content per erythrocyte of swine suffering from iron or copper deficiency anemia was found increased by Schultze and Elvehjem.[2] A somewhat similar condition has been found in swine made anemic by hemorrhage, then fed rations composed of corn, alfalfa meal and minerals including iron and copper.[3] These findings indicated that in at least two conditions characterized by a decrease in the number of erythrocytes and a decrease in hemoglobin, there is a compensating rise in the glutathion content per cell. In the previous report[1] we showed certain other changes in the blood of experimental swine infected with hog cholera. The amino acid nitrogen of the cells varied significantly during the course of the disease. We were unable to attempt an interpretation of the fluctuations at that time. The observations of Schultze and Elvehjem and our own experiments with deficiency diseases indicated that the glutathion content of the blood might vary during the course of any disease. A decrease in the number of erythrocytes is a common finding in hog cholera. This has been shown by different investigators, including Oglesby, Hewitt and Bergman.[4]

In all cases of cholera studied there has been a decrease in the number of cells during the course of the disease, but in many cases this has been followed by an anhydremia which produced a definite polycythemia. Disturbances in the water balance undoubtedly play an important role in most disease processes. In these studies we have attempted to eliminate as many factors as possible which might contribute to chemical changes in the blood as a result of improper nutrition and management.

Nine pigs were used in this experiment; five were fed the basic ration plus 3% bonemeal, while the remaining four received the basic ration only. All animals

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[1] Eveleth, D. F., and L. H. Schwarte, 1939. Chemical changes in the blood of swine infected with hog cholera. *J.A.V.M.A.* 94:4, pp. 411-417.

[2] Schultze, M. O., and C. A. Elvehjem, 1936. Studies on the glutathione content of the blood in nutritional anemia. *Jnl. Biol. Chem.* 116, p. 711.

[3] Schwarte, L. H., and D. F. Eveleth, 1939. Alfalfa meal as a supplement to corn in the rations of artificially depleted young pigs. *Vet. Med.* 34:8, pp. 494-497.

[4] Oglesby, W. T., E. A. Hewitt, and H. D. Bergman, 1932. Certain chemical and morphological phases of the blood of normal and cholera infected swine II. Certain morphological phases. *Iowa State Jnl. Sci.* 6, p. 227.

TABLE I.—THE SERUM BASES DURING EXPERIMENTAL HOG CHOLERA (ALL DATA IN MG. PER CENT).

Days after injection	Ca. Range	Ca. Av.	Mg. Range	Mg. Av.	Na. Range	Na. Av.	K. Range	K. Av.
0	11.4-12.5	11.7	3.18-3.47	3.27	332-380	351	23.8-31.5	27.3
2	11.1-13.2	11.7	3.14-3.50	3.29	320-374	347	26.4-31-2	28.7
4	9.9-12.1	11.2	2.96-3.43	3.08	336-360	347	25.7-41.0	33.2
6	10.0-11.7	11.0	2.94-4.23	3.34	330-360	343	20.2-46.0	27.8
8	9.8-11.7	10.3	2.89-3.43	3.09	284-344	319	16.6-28.7	23.9
10	10.4-11.7	10.9	2.74-3.82	3.03	292-344	316	20.0-38.5	28.5

were fed cod-liver oil to insure an adequate supply of vitamin D. The basic ration consisted of:

Yellow corn	70%
Tankage	10%
Alfalfa meal	10%
Soy bean meal	10%

After a 40-day feeding period the cholera experiment was started.

All blood samples were taken prior to the morning feeding. At the same time temperatures of the pigs were obtained. Each pig was injected with 3cc. of a commercial hog cholera virus. The hemoglobin was determined by the Newcomer method, while the erythrocyte counts were made by the usual technic. Glutathion was determined on citrated blood by the method of Woodward and Fry.[5] The calcium and magnesium methods were the same as those used previously.[1] Sodium was determined by a modification of Weinbach's[6] method. Potassium was precipitated with sodium cobaltinitrite and the nitrite determined by oxidation with potassium dichromate in acid solution. The excess dichromate was titrated with the reagent of Harger.[7]

All pigs showed typical cases of clinical hog cholera with characteristic temperature reactions. Pig No. 69 died on the sixth day, and the remaining eight pigs were killed on the tenth day after injection of the virus. At the time the eight animals were killed they were in a moribund condition and early pulmonary complications were developing in several.

The minimum, maximum and average values for the serum constituents are summarized in Table I. The average deviation

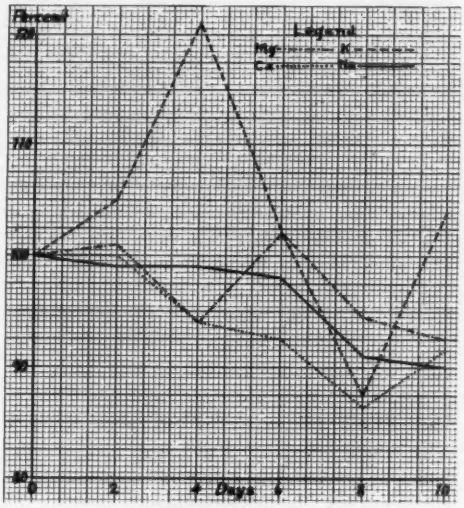

Fig. 1. The percentage deviation of the serum bases in hog cholera

of the serum bases are shown in Fig. 1. The average value of a given constituent for the nine pigs at the initial period is taken as 100%. (This was considered advisable because of the similarity of the chemical composition of the serum of the two groups at the time of first sampling.)

The preinjection calcium for the five supplemented pigs was 11.8 mg per cent, while the four animals receiving the basic ration had an average calcium of 11.6 mg per cent. These data show that in both rations there was adequate calcium and vitamin D to indicate a normal calcium metabolism prior to the injection of the cholera virus. The other minerals, as well as proteins and vitamins, were adequate in the ration fed.

The data obtained in these experiments substantiate the previous observation[1] that during the course of hog cholera there is a definite decrease in the serum calcium. In the earlier experiments no attempt had

[5] Woodward, G. E., and E. G. Fry, 1932. The determination of blood glutathione. *Jnl. Biol. Chem.* 97, p. 465.
[6] Weinbach, A. P., 1935. A micromethod for the determination of sodium. *Jnl. Biol. Chem.* 110, p. 95.
[7] Harger, R. N., 1935. A simple micromethod for the determination of alcohol in biologic material. *Jnl. Lab. and Clin. Med.* 20, p. 746.

been made to furnish vitamin D while the animals were confined indoors. The animals used here had been fed cod-liver oil, and two levels of calcium were used in both experimental and preliminary feeding periods. As shown in Fig. 1, the decrease in the serum calcium during the first eight days was independent of the changes in the other serum bases. The serum magnesium did not follow the same trends in these experiments as it did in the first ones. Fig. 1 shows two definite depressions in the magnesium curve, the first occurring on the fourth day and the second on the tenth day. The peak in serum magnesium on the sixth day is due in part to one very high value for pig No. 69, which died about four hours after the sample was taken. However, four of the nine pigs had higher serum magnesium at this time than were found in the initial analysis. The potassium values were definitely increased on the fourth day after injection. All nine pigs had increases above the initial value for serum potassium at this time. By the eighth day only two of the eight pigs had higher serum potassium than during the preinoculation period On the tenth day most of the pigs again showed increases in serum potassium. The serum sodium average was very constant until the eighth day, when a significant decrease was observed.

The data obtained on the serum bases indicate that significant deviations from normal occur during the course of experimental hog cholera. The changes in sodium are not significant until the disease has progressed to the stage where many of the animals are moribund. The serum potassium shows the greatest change by increasing during the late incubation period of the disease. The serum calcium shows a progressive decline during the course of the disease.

The data obtained on pig No. 69 are shown graphically in Fig. 2. This animal died of acute cholera early in the experiment, no secondary conditions having developed. The marked increase in potassium and magnesium with decreases in calcium and sodium suggest the possibility of such a disturbance in the bases of the serum as to produce a potassium toxemia.

The data with respect to the hemoglobin and erythrocyte counts and the total glutathion are summarized in Table II. The differences in the rate of response to the disease process make it unsatisfactory to use mean values. In all cases there was a definite decrease in the hemoglobin and erythrocyte counts and the total glutathion during the course of the disease. The ratio of glutathion to erythrocytes was rather erratic in most cases. On the fourth day following the injection, six of the nine pigs had a lowered $\frac{GSH}{RBC}$ value. The $\frac{GSH}{RBC}$ value had a tendency to remain low on the sixth and eighth days. By the tenth day pigs Nos. 67 and 68 showed an increase in this value.

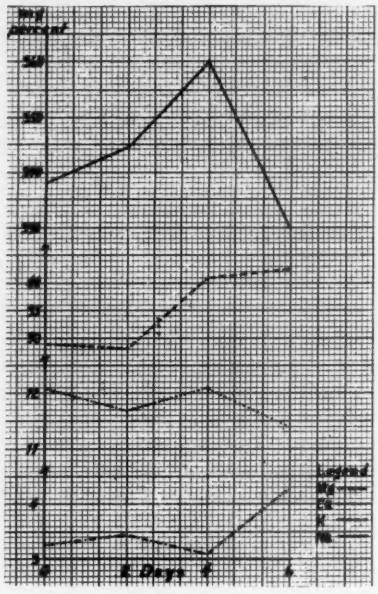

Fig. 2. The serum bases of Pig No. 69

Discussion

The change in sodium, magnesium and calcium do not appear to be great enough to account for the symptoms of hog

cholera. The increase in potassium and decrease in sodium and calcium may be sufficiently great to produce an ionic imbalance which would result in the development of a potassium toxemia. The decrease in serum calcium found in this study substantiates the previous observation[1] that there is a decrease in the serum calcium during the progress of the disease. The changes in the serum magnesium appear to be insignificant. The blood chemistry of the animals suggest a marked adrenal insufficiency. The data on the whole blood chlorides in the previous study did not show very much change in the level of chlorides during the course of the disease.

The low values for whole blood glutathion probably contribute to the pathology of hog cholera. The decrease per cell would indicate a slowing up of tissue metabolism. It is of interest in this respect to discuss the sugar content of the serum. On the tenth day the serum sugar for the eight pigs varied from 69 to 152 mg per cent, with an average of 100 mg per cent. This is a definite high normal average. In Hewitt's[8] work on swine infected with hog cholera, he found a hypoglycemia. We have always made our glucose analyses as soon as possible after drawing the blood. This prevents enzymatic decomposition of the blood sugar. A hypoglycemia is frequently encountered in diseases affecting the adrenal glands. It may be that in some stages of cholera the potassium would be higher and the sugar lower.

The failure of glucose utilization was not correlated with the glutathion values, so that it was evident that other factors were involved also. In this and other studies on the chemical composition of pathologic blood the significance of certain deviations from normal are difficult to interpret. In a disease such as hog cholera the failure of normal tissue metabolism to take place seems to involve a different mechanism than that found in the nutritional deficiency diseases. This phase of the studies on the chemical pathology suggests that the study of the failure in tissue metabolism may form a basis for a more fundamental attack on the general problem of the chemical deviations in disease.

[8] Hewitt, E. A., 1932. Certain chemical and morphologic phases of the blood of normal and cholera infected swine. I. The concentration of certain chemical constituents. *Iowa State Jnl. Sci.* 6, p. 143.

TABLE II.—CHANGES IN THE BLOOD CONSTITUENTS OF EXPERIMENTAL ANIMALS

Pig No.	Days after injection of virus: 0	2	4	6	8	10
Hemoglobin: Grams per 100cc of Blood						
67	13.2	13.4	12.1	12.6	11.8	11.5
68	13.8	12.7	11.5	11.8	11.5	11.0
69	12.8	12.6	10.8	20.5	—	—
70	14.4	14.0	13.4	11.2	11.6	11.3
71	11.2	11.8	11.2	9.8	9.2	10.2
72	12.7	11.2	9.8	9.7	8.5	9.4
73	10.5	9.4	8.7	8.5	9.2	10.0
74	14.0	14.2	14.0	13.6	12.2	12.1
75	14.5	14.8	12.6	12.2	13.4	13.5
Erythrocytes: Millions per cu. mm. of Blood						
67	7.2	7.4	6.0	6.4	6.0	5.2
68	7.0	6.8	5.2	5.6	5.4	4.0
69	7.2	6.9	6.0	10.1	—	—
70	6.8	6.4	7.6	6.8	6.4	6.0
71	7.6	6.7	7.7	6.0	5.2	6.0
72	7.0	6.5	5.2	5.2	5.2	5.2
73	6.4	6.2	6.0	5.6	4.6	4.8
74	7.0	7.4	5.8	5.1	6.0	7.0
75	7.2	7.2	7.2	6.0	6.2	8.0
Total Glutathion: Mg. per 100cc of Blood						
67	33.9	42.0	33.9	35.4	32.5	34.3
68	37.4	40.5	33.0	35.0	31.9	31.3
69	36.8	41.0	35.6	51.0	—	—
70	37.4	38.6	36.2	34.3	31.3	31.3
71	40.5	35.6	28.2	26.4	24.5	26.4
72	39.3	35.6	25.1	25.8	28.5	29.1
73	33.2	37.1	23.3	27.0	25.1	28.5
74	38.0	36.8	30.6	37.4	30.3	30.1
75	30.1	41.7	27.0	30.6	27.6	27.0
Ratio of Glutathion to Erythrocytes $\left(\frac{GSH}{RBC}\right)$						
67	4.7	5.7	5.6	5.5	5.4	6.6
68	5.3	5.9	6.3	6.3	5.9	7.8
69	5.1	5.9	5.9	5.0	—	—
70	5.5	6.0	4.8	5.1	4.9	5.2
71	5.3	4.6	3.7	4.4	4.7	4.4
72	5.6	5.5	4.8	5.0	5.5	5.6
73	6.2	6.0	3.9	4.8	5.5	5.9
74	5.4	5.0	5.3	6.1	5.1	4.3
75	4.2	5.7	3.8	5.1	4.5	3.4

Summary

The calcium, magnesium, sodium and potassium of the serum of swine artificially infected with hog cholera virus have been determined. During the course of the disease there develops a hyperpotassemia, with decreases in the sodium and calcium.

A preliminary period of feeding a high calcium phosphate ration did not give any protection to the animals when injected with hog cholera virus.

In most cases the glutathion content per cell decreased during the course of the disease.

Recent Materia Medica

XIV. The Sex Hormones

By PROF. VICTOR LEWITUS
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PERHAPS greater progress has been made in the study of the gonads and their functions than of any other phase of endocrinology, and this for at least two important reasons: the development of accurate assay methods and the availability of highly purified isolates or synthetic substances. Other phases of endocrinology have not met with such success, and therefore thyroid, adrenocortical, and gonadotropic therapy is not so thoroughly established as gonadal therapy.

Androgens

Man very early observed the effect of castration on domesticated animals. The ancient Chinese are said to have been the first to practice castration. There are occasional references to eunuchs in the Bible. John Hunter, in 1726, is reputed to have made testis transplantations into hens, but the first true study of gonadal replacement is attributed to Berthold who experimented upon capons in 1849. He observed that following transplants of the rooster's testes, regeneration of the capon's comb was brought about. In 1889, Brown-Séquard went a step further, for he stimulated his own functions by introducing extracts of dog and guinea pig testes into his own system. In 1927, McGee demonstrated that a carefully prepared extract of bull testes could restore capons to the normal masculine state, and a year later McGee and others established the use of the brown leghorn capon for assaying androgens, by testing the substance under investigation for its ability to develop the secondary sex characters in caponized animals.

Buckner and others have shown that when birds are dubbed the testes enlarge. Hoskins has found that when birds are caponized the comb atrophies. Buckner and Womack have shown independently that other factors, such as light and darkness, influence the stimulant effect of androgenic hormones. Breneman has observed that there is a direct relationship between the size of comb and the development of the seminiferous tubules (not the interstitial tissue). Marlow and Payne have made further hormone studies of normal and dubbed birds. Since hormones are known to be excreted in the feces and urine, extraction of the droppings was made. Two groups from the same hatch were selected, one normal and the other dubbed when eight weeks old. The droppings were collected on oiled paper and this material was extracted in alcohol and studied. Body weight, comb volume and weight, and weight of testes were also studied, and the testes were examined histologically. It was found that the weight of the testes of dubbed birds was about double that of the normal birds. No significant histologic differences were noted with respect to progression of spermatogenesis. The size of the tubules and the amount of interstitial tissue appeared to be similar in the two groups. The body weight of dubbed birds was found to resemble that of capons (about 15% greater than normal).

Unlike most other endocrine organs, the testes contain such small amounts of active hormonal material that a considerable degree of concentration must be attained before chemical or biological assays become practicable. The lipin fraction of bull testes was found to be a rich source of androgens, and human male urine was found to have large amounts of the material also. In 1931, Butenandt isolated a pure crystalline male sex hormone from the latter source which he called androsterone. From here on the chemistry of the sex hormones became easier to study, and the relationship of androsterone to cholesterol was established by Ruzicka and others in 1934. It was discovered that a number of androgenic substances closely related to one another, although varying considerably in potency, existed in the testicular extracts. In 1933, Gallagher and Koch devised the "comb-growth" unit, and with this test it was shown that the urine of sexually mature males contained a very active androgen. In 1935, Laqueur and others isolated the exceptionally potent androgen, testosterone from

testis extracts. In the same year, Davids and Josephy determined the constitution of this very complex hormone; and soon thereafter, Ruzicka synthesized testosterone from cholesterol. Today, the use of urine as a source of the active male hormone has been largely discontinued, chief reliance being placed on the synthetic substance. Esterification has been found to activate and prolong the effects of the testosterone, so that the substance chiefly used for intramuscular administration is testosterone propionate ($C_{22}H_{32}O_3$). Recently, an oral form of the substance, called methyl testosterone, has been developed, which is about one-third or one-quarter as potent as testosterone proprionate injections. Methyl testosterone is also used in ointments for local application (inunction).

Summarizing recent observations, it may be stated that there are at least six androgens which have been isolated in pure form from animal tissues and human urine. Though testosterone is considered to be the truly active male sex hormone, it is likely that the different species may elaborate other forms of androgens. Testosterone probably gives rise to less active androgens such as androsterone and dehydroandrosterone. The latter two are examples of excretion products, that is, inactivated forms of potent androgens which are probably glycuronides. Androgens have been demonstrated in female urine also, but their exact character is not well understood. Under certain conditions, it has been found that the adrenals may produce androgenic substances; such a condition has been demonstrated in abnormal hirsutism. Koch has found the following values for urinary excretion of androgens:

Animal	International Units
Stallion	1 to 8 per liter
Bull	less than 1 " "
Ram	4 " "
Rat	less than 1 " "
Man (25 to 35 yrs.)	40 to 100 per day
Woman (23 to 34 yrs.)	30 to 100 " "
Boy (6½ to 10 yrs.)	0.7 to 2.0 per liter
Girl (8 to 10 yrs.)	1.8 to 2.0 " "

Testosterone has been used in humans to treat male hypogonadism (castrates), primary testicular failure (eunuchoidism), anterior pituitary hypogonadism, impotence, and to relieve symptoms of prostatic hypertrophy (not to reduce the enlargement, however). It has not been demonstrated that the male sex hormone directly cures male sterility, or that it stimulates spermatogenesis. In fact, large doses may produce an opposite effect (oligospermia). Stimulation of the accessory male sex organs, such as the seminal vesicles, prostate, and penis, has been a common finding; in fact, the rat-prostate test is sometimes employed for determining the potency of androgens. In this test, infantile male rats are injected with the hormonal material under investigation and the maturation (enlargement) of the seminal vesicles and other accessory sex organs is noted. The ratio of the seminal vesicle units to the comb-growth units mentioned previously varies considerably with each product.

Incidentally, it should be noticed in passing that androgenic substances are being widely applied in the human female. Since the male sex hormone has long been known to neutralize certain effects of the female sex hormones, it has given surprisingly good results in such conditions as excessive uterine hemorrhage, mastopathy (painful, swollen breasts), and unwanted lactation. A less common application is its use to cause enlargement of the clitoris, in order to reduce or eliminate frigidity. Experimental work by Selye and others has shown that deficient development of the ovaries, uterus, and vagina may follow the continuous or persistent use of androgen in very immature rats. Inhibition of ovarian development can occur in both immature and adult animals. Enlargement of the kidney and clitoris is also observed in rats. Testosterone, however, has been found to markedly stimulate uterine activity in the adult rat. Selye and others have reported stimulation of milk secretion in immature male as well as in female rats following the use of testosterone. This unexpected finding points to the possible conversion of the male sex hormone into estrogenic substances. Unlike estrone, which inhibits somatic and hypophyseal growth, large doses of testosterone have not been found to retard growth, even though such

doses do inhibit gonadal development in both sexes.

Application

Testosterone or its derivatives may be used to increase potency, to potentiate erectile power, and to provide for the well-being of asthenic or run-down animals. It has also been used in correcting cryptorchidism in animals. Etienne and Robertson have reported that testosterone propionate proved useful in the treatment of non-bacterial inflammation of the prepuce and meatus of dogs. Engle and MacBrayer have recently reported favorable results following the use of testosterone propionate in the treatment of sexual impotence in dogs. The dosage ranged from 10mg to 25mg per injection, libido being increased even after the first injection in certain instances. The possibilities for use of the hormone in the female have not been studied to any great extent in veterinary medicine, but the chance of the androgen serving as an aphrodisiac should not be overlooked. Allee, Collias, and Lutherman report that when testosterone propionate is injected into low-ranking individual white leghorn hens, their social status is elevated; in fact, their position is changed to the top rank of the flock. Hormone-treated pullets are more aggressive and successful in initial contacts with strange birds than they were prior to injections. The comb size varies to such an extent in the hen that it is an index of the amount of male hormone present. Other effects besides increased size of comb include suppression or retardation of egg-laying, initiation of crowing, and at times courtship. All of these changes disappear after cessation of the male hormone injections, but the higher social status once established is retained.

Testosterone propionate is marketed as: neo-hombreol, perandren, oreton, etc.

Estrogens

For purposes of simplification, the following resumé of what is known regarding the human female sex hormones is presented.

The ovarian secretion contains two groups of hormones: the follicular hormone elaborated in the Graafian follicles; and progesterone, produced by the corpora lutea. Estrogens may be defined as hormonal substances capable of producing estrus in adult ovariectomized animals. It should be remembered that these hormones are under the influence of the gonadotropic hormones of the pituitary gland. Estrogenic hormones generally control the development of the female genital tract and the mammary glands. In order to ensure proper genital development in the female animal, they must be present previous to maturation. These female sex hormones have to do with the appearance of the secondary sex characteristics. The estrogens are essential for maintenance of the normal menstrual cycle.

One of the most important contributions toward the progress of estrogen therapy was the discovery of the "vaginal smear" test by Allen and Doisy in 1923. Following the administration of a given amount of the estrogen under test, the ovariectomized mouse shows distinctly cornified epithelium in the vagina. These non-nucleated cells persist so long as follicular activity is exerted. This is considered to be a "positive smear," the amount of estrogen producing such a response being called a "mouse unit." In 1926, Laqueur prepared a highly purified estrogenic solution which was called menformon. In 1927 Zondek extracted estrogenic hormone (chiefly estriol) from the urine of pregnant women in amounts large enough to make the source commercially important. In 1930 he obtained still larger quantities (practically all estrone) from pregnant mares' urine, and today's supply of estrone is nearly all obtained from this source.

After many years of study it has become the consensus of most authorities that there are three estrogens — estrone, estriol, and estradiol. Estradiol appears to be the most potent estrogen found naturally in follicular ovarian fluid; although probably present in the follicle in small amounts, estrone and estriol are mainly excretion products. It appears that estradiol is converted to estrone and finally to estriol prior to excretion in the urine. The estriol is changed to the form of estriol-glucuronidate before excretion, this compound probably being formed in the liver. It is this substance which is excreted in abundance by women during the second part of gestation.

Estradiol is chemically dihydroxyestrin. It is used chiefly in the form of oral tablets and is usually the estrogen of choice for this method of administration. For intramuscular administration, a derivative of estradiol (estradiol benzoate) has been synthesized; this has been found to have longer lasting properties. Recently another derivative, estradiol dipropionate, has been found to have even longer lasting qualities. The parenteral preparations are available in oil solution. Estradiol is available under the names dimenformon, ovocylin, progynon-DH, etc. Estradiol benzoate ($C_{25}H_{28}O_3$) is available as dimenformon benzoate, progynon-B, ben-ovocylin, etc. Estradiol dipropionate is available as dimenformon dipropionate, progynon-DP, di-ovocylin, etc.

Estrone is chemically ketohydroxyestrin ($C_{18}H_{22}O_2$). It is used chiefly in oil solutions for intramuscular administration, but is also prepared in the form of vaginal suppositories and ointments. It is about 10 times less active than estradiol, judging by its influence on uterine development in rats. Its effects are not nearly as long lasting as those of estradiol benzoate. Estrone is available in the form of natural mixtures of ovarian extract, or as the pure substance under the names menformon, theelin, estrone, etc.

Estriol, though feeble upon injection, is said to be more active than estrone by mouth. It is chemically trihydroxyestrin ($C_{18}H_{24}O_2$). It is issued in the form of capsules, tablets, and liquid for oral use. Its effects are not as long lasting as those of estradiol benzoate. It is available under the names theelol, estriol, etc.

Recently some artificial estrogens have been synthesized from phenanthrene. One of these is stilbestrol which, though it bears little resemblance to the naturally occurring estrogens, is said to be highly active. However, clinical reports have shown it also to be quite toxic in a large number of cases. It is mainly intended for oral use.

Estrogenic substances, though differing from one another quantitatively, have similar qualitative influences. They are capable of inducing the following effects: In castrate females, the vagina, uterus, tubes, and breasts are developed to a normal stage following moderate dosage. Most characteristic is the estrus reaction, formerly employed as a basis for biological assays. Furthermore, the estrogens maintain the vaginal epithelium in the cornified state, large, nonnucleated cells predominating. This indicates positive maintenance of estrual cycles. Excessive doses of estrogen cause hypertrophy of the uterine endometrium and rapid development of the mammary ducts. Estrogens are well known for their stimulant effects on uterine and tubular contraction. It has also been observed that during pregnancy the sensitivity of the uterus to the oxytocic principle of the pituitary gland (posterior portion) is increased by the presence of estrogens. When estrogens are given to normal animals, certain gonadotropic functions are inhibited and hence the secretion of pituitary gonadotropic principles is arrested. It should be noted that the physiologic function of estrogens is generally opposite to that of progesterone, though in some respects one cannot function without the other. For example, progesterone can affect the endometrium only after the estrogens have properly sensitized it.

Application

Though estrogens will undoubtedly have an established place in future veterinary medicine, their present status is uncertain. Perhaps when estrual cycles are better understood and the reasons for sterility determined, this important group of hormones will be found practicable. In humans, they have mainly been employed to establish normal menstrual cycles (with or without progesterone therapy); to relieve disturbances of the menopausal epoch; to retard excessive lactation; and to cure certain vulvo-vaginal lesions such as kraurosis vulvae and infantile gonorrheal vaginitis. Whitney has recently reported the use of estrogen in preventing conception—probably on the theory that progestational influences are counteracted. In discussing sterility in mares associated with irregularities of the estrous cycle, Day mentions the use of luteinizing and follicle stimulating hormones in treating cystic ovaries and irregularities of the estrous cycle associated with abnormal pituitary stimulation.

Progesterone

The discussion of this substance, like that of the estrogens, is based chiefly on its functions with respect to the human female cycle.

It has already been mentioned that the ovary furnishes two groups of hormones, the estrogens (follicular hormones) and the progestational hormone (progesterone, progestin). Once rupture of the follicle occurs, and the fluid and ovum escape, the follicular wall collapses. Immediately following ovulation, the corpus luteum is formed, infiltration of its cells by a lipochrome called lutein taking place. The yellow color is due to a trace of carotene. The corpus luteum grows and is converted into a glandular structure which persists until the next menstrual period. During menstruation it gradually undergoes involution, being converted to a hyaline, scar-like structure. However, in case fertilization occurs, the corpus luteum does not involute, but increases in size and persists throughout the period of gestation. In the human, involution begins at about the sixth month of pregnancy.

In 1934, the crystalline hormone progesterone was isolated by Allen and Wintersteiner in this country and by Slotta, Ruschig and Fels in Europe. Butenandt and others synthesized the hormone from stigmasterol, a sterol occurring in soya beans. This hormone is closely related to certain of the androgenic and estrogenic hormones. Quite recently, one form of progestational hormone has been synthesized which is actually a testosterone derivative and is called pregneninonol or pregneninolone (anhydrohydroxy-progesterone). Progesterone is administered by intramuscular injections; pregneninolone is given orally.

The function of the corpus luteum hormone, progesterone, is quite well understood. Its chief function is to prepare the uterus for nidation of the ovum and nutrition of the embryo. For this purpose, the progesterone causes extensive development of the endometrium, so that by the time the fertilized ovum reaches the uterus the endometrium has reached a stage of secretory activity, thus being prepared for the reception and nourishment of the embryo. It has been shown that removal of corpus luteum during the early stages of pregnancy prevents implantation of the embryo, and in case implantation has already occurred, pregnancy is interrupted.

In castrated rabbits, progesterone has been found to produce progestational changes in the uterus. If the corpora lutea are destroyed during early pregnancy, the administration of the hormone will carry the animal through to the full term without abortion. Premenstrual endometria have been produced in monkeys by Hartman and others. Kaufmann has produced a premenstrual endometrium in human female castrates by first injecting large doses of estrogens to bring about return to the interval endometrium, and then giving progesterone to induce premenstrual changes.

Corner and Allen have established an assay method in which castrated rabbits are studied for the effect on the endometrium. The substance under investigation is injected in five equal doses over five days and on the sixth day the animal is killed and the uterus sectioned. The smallest dose producing a state in the uterus comparable to that of a normal eight-day pregnancy is called one rabbit unit. Today, progesterone is standardized in terms of weight, since it is a pure crystalline substance. Progesterone is excreted in the urine chiefly as pregnandiol glucuronidate. It is found there during the second half of the human menstrual cycle. Since large amounts are produced during pregnancy until toward the end of term, when there is a sudden drop, it has been proposed that this be used as a human pregnancy test; but since the Aschheim-Zondek test is far more accurate, this proposal has not been adopted.

The term "progestin" is used to designate synthetic as well as natural corpus luteum hormone. Progesterone is also available as proluton, lutocylin, lutromone, etc.

Application

As in the case of estrogens, the use of progestational hormone is not established in the veterinary field. However, since it is used to arrest excessive uterine hemorrhage, to prevent abortion, and to establish normal menstrual rhythm in humans, some such use may be transferred to veterinary practice.

Omentopexy for the Correction of Ascites in the Dog

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ASCITES occurs commonly in small animals. It may arise from various causes, including (1) congestion of the area of the portal circulation, sometimes caused by pressure on the portal vein from tumors situated in the pylorus or pancreas, echinococci in the liver, enlarged lymphatic glands and cicatrices, or from thrombosis of the portal vein, but most frequently by chronic diseases of the liver (cirrhosis, echinococcosis, tumors); (2) diseases of the peritoneum, including tuberculosis, parasitisms, tumors, peritonitis; (3) certain heart diseases or chronic affections of the lungs. More rarely, other conditions may operate to cause the accumulation of fluid in the abdominal cavity. In young dogs, apparently idiopathic ascites sometimes appears, undergoing spontaneous cure as the animal develops.

Treatment for ascites is usually symptomatic (diuretics, laxatives, heart stimulants, etc.). Where the accumulation of fluid is considerable, paracentesis abdominis is performed. In many cases these measures suffice to relieve the ascitic condition, the outcome of the case then depending upon the primary cause of the condition and the possibility of its cure. In some instances, however, the ascites persistently recurs in spite of medicinal treatment and repeated surgical removal of the fluid.

It has been suggested by Dr. Konikov, professor of anatomy in the School of Medicine, that for such cases of persistent ascites an adaptation of Talma's operation (used in human surgery) might be of avail. Talma's operation is used to relieve ascites in man arising from Banti's disease (an affection characterized by enlargement of the spleen, anemia, dyspnea, and cirrhosis of the liver) or from similar conditions. Its purpose is to establish anastomoses between the systemic and portal venous systems.

Case Record

April 14, 1941, a five-year-old brown long-haired dog, weighing 66 pounds, was presented for treatment at the veterinary hospital at Middlesex University. The patient was in apparent good health except for a marked generalized ascites.

According to the owner, the sire of the patient was a collie, the dam a Belgian shepherd. The first indication of the malady was in November, 1940, when an increase in the size of the abdomen was noticed. The dog, a family pet, had always eaten well and been alert and active. He had had excellent care, but had always been a garbage eater, and liked to frequent the woods where sportsmen were hunting small game.

The dog had been under treatment for nearly three months, the treatment consisting of a special diet, medication, and periodic surgical removal of fluid. These measures had not brought about an improvement in the condition; in fact, the amount of dropsical fluid was increasing steadily, as may be seen in Table I, and the dog was losing flesh.

The discomfort of the distended abdomen caused the patient to sit or lie down most of the time. When sitting he turned his left hind foot under and the abdomen came in close contact with the floor. Both flanks were markedly distended. Sight, hearing and smell were normal, the hair was long and glossy, the skin devoid of any edematous swellings. Temperature was 102.2° F., pulse 110, and respiration 30. There was no nausea nor vomiting, and the animal ate and drank well. Heart bruits were absent. Clinically, the respiratory system exhibited no pathological picture. On palpation the abdomen was firm, but it undulated on pressure. On percussion a "full" sound was heard.

On the day of admission to the clinic, 12,000cc of dropsical fluid was removed by paracentesis. The fluid was reddish yellow, slightly cloudy, and sticky to the touch. It did not coagulate readily. It was slightly

TABLE I.—TREATMENT BEFORE OMENTOPEXY.

Date 1941	Amount of Fluid Extracted	Treatment	Remarks
Jan. 24	500cc	Potassium Iodide. Fish and meat diet. Mineral oil.	Improvement noticed.
Jan. 28	1500cc	Potassium Iodide. Fish and meat diet. Mineral oil.	Improvement noticed.
Feb. 25	1500cc	Potassium Iodide. Fish and meat diet. Mineral oil.	Improvement noticed.
Mar. 6	2000cc	Sodium Iodide. Mineral oil.	Fluid came in much greater quantities. Dog began to lose flesh.
Mar. 20	2000cc	Sodium Iodide. Mineral oil.	Fluid came in much greater quantities. Labored breathing markedly noticeable.
Apr. 1	2000cc	Sodium Iodide. Mineral oil.	Fluid came in much greater quantities. Labored breathing markedly noticeable.
Apr. 7	4000cc	Sodium Iodide. Mineral oil.	Fluid came in much greater quantities. Labored breathing markedly noticeable.
Apr. 14	12,000cc	Medication withheld.	Exploratory laparotomy decided upon.

alkaline. There was 3% of albumin. The specific gravity was 1.021 at 23.5° C. No microorganisms were demonstrated with standard laboratory methods. The fluid contained no normal red blood cells, but blood pigments and traces of hemolyzed cells were present. A smear prepared with Wright's stain revealed a predominance of mesothelial cells. This cytodiagnosis helped to establish the fact that this was a transudate and not an inflammatory exudate.

It was decided to perform an exploratory laparotomy, and this was carried out on April 16, two days after admission to the clinic. The abdominal cavity was first punctured and 400cc of the ascitic fluid removed, in order to prevent the severe shock likely to ensue from a sudden loss of huge quantities of the liquid when the abdomen was opened.

Since the presence of the ascitic fluid made it difficult to judge the dog's weight, only 5cc of nembutal was given intravenously. This was followed by ether to insure complete surgical anesthesia. An incision five inches long in the median line two inches posterior to the xiphoid cartilage was made and continued through the fascia and the external and internal oblique muscles. A small puncture, about one-half inch long, was made into the peritoneal cavity, and an additional 1200cc, comprising most of the remainder of the dropsical fluid, was removed. Emission of the fluid was facilitated by depressing the abdominal wall. One cc of epinephrine hydrochloride 1:1000 was given intramuscularly to support the heart action. A blunt-pointed pair of scissors was then introduced into the peritoneal opening

TABLE II.—BLOOD COUNT.

Red Blood Count	5,250,000
White Cell Count	10,500
Differential Blood Count	
Neutrophiles	66%
Eosinophiles	0%
Basophiles	0%
Lymphocytes	30%
Monocytes	4%
Hemoglobin	90%

TABLE III.—URINE ANALYSIS.

Color	Yellow
Odor	Slightly pungent
Transparency	Clear
Reaction to Litmus	Acid
Specific Gravity	1.034 at 23°C.
Sugar	Negative
Albumen	Positive
Indican	Negative
Acetone	Negative
Bile	Positive
Bile Acids	Positive (0.01% or more)
Microscopic examination	Amorphous crystals

and a cut was made the entire length of the primary incision.

The liver, gall bladder, and bile duct were examined; the portal vein entering the liver was palpated and examined; and the abdominal cavity was explored for cysts and tumors. The liver was found to be enlarged and firm, with the surface rough and patchy, and grayish-red in color. Two reddish-white, elastic blood clots, about two inches square, studded with yellow particles, were found in the abdominal cavity. No other pathological condition was observed. There were no biliary concretions in the gall bladder, for bile was easily forced through the cystic duct. The portal vein appeared normal, and no emboli were palpated.

Since it appeared most probable that the ascites was caused by obstruction of the portal circulation due to cirrhosis of the

liver,[1] Dr. Konikov's suggestion of omentopexy was carried out in order to establish anastomoses between the portal and systemic venous system. Relaxation of the overdistended muscles by removal of the ascitic fluid enabled the operator to evert easily the margins of the wound. After the peritoneum and muscles had been harshly incised by crisscross cutting with a scalpel, the omentum was sutured with No. 2 chromic catgut to the internal oblique muscle, using two interrupted sutures. The incision through the peritoneum and muscles was closed by means of a continuous suture, employing No. 2 catgut, and the skin incision with interrupted sutures. No provision for drainage was made.

The skin sutures were removed in five days. Healing was uneventful. So far as could be judged, there was no excessive increase of fluid in the abdominal cavity following the operation. Of course, the process of building a collateral circulation by anastomosis is relatively slow, and it was to be expected that the transudation of the edematous fluid would continue to some extent for a few weeks after the operation. It was obvious, however, that the fluid was not accumulating at the same rate as before the operation, if at all; an indication that the omentopexy was accomplishing its purpose.

The patient put on flesh slowly after the operation. After six weeks he weighed only 47 pounds, but appeared to be bright and in good spirits. Two weeks later he weighed 49 pounds. This weight increase appeared to be the result of a normal putting on of flesh; there was no indication of any appreciable increase of fluid in the abdomen.

The patient six weeks after the operation

Comments

The result of this surgical procedure for persistent ascites is encouraging. Obviously, it would be applicable only in cases where the inciting cause of the ascites is an interference with the portal circulation. In this case, the interference with the portal circulation was apparently caused by cirrhosis of the liver, possibly arising from the dog's garbage-eating habits.

Relief of the ascites in such cases would of course have no effect on the course of the primary disease, other than that the removal of the complication would improve the general condition of the dog and thus make the prognosis more hopeful in cases where the primary disease is amenable to treatment; or would prolong the animal's life where the primary disease is incurable but of a mild, chronic nature not interfering with its comfort or usefulness.

Where ascites persists in spite of medical treatment and paracentesis, an exploratory laparotomy is indicated. If the pathological condition is one which interferes with the portal circulation, and is such that the interference cannot be eliminated directly (e.g., by removal of a tumor), the results of this experiment indicate that omentopexy to relieve the ascites would be advisable in those cases in which there is a reasonable chance of recovery from, or living comfortably with the primary disease.

Further trial of the operation will be required before its efficacy can be definitely affirmed.

[1] The diagnosis of cirrhosis of the liver was not confirmed microscopically because it did not seem advisable to perform a biopsy at the time of the operation. However, the clinical picture was indicative of chronic hepatitis.

Whipworm Hysteria in Dogs

By J. H. EMMERSON, Quincy, Massachusetts

DURING the past eight months we have come to recognize a specific barking hysteria in dogs between the ages of five months and two years. We have found that in such cases the fecal examination is positive for whipworm ova. Five dogs with this type of hysteria have been subjected to necropsy examination, and in all cases whipworms were found in the ceca, and tiny ulcers in the cecal walls. In two cases the ceca were thickened. No other cause for the hysteria could be assigned. We do not know whether the hysteria is due to the inflammation, to toxic metabolic substances, to mechanical irritation by the whipworms or to a combination of these causes; but it is clear that the hysteria does arise in some manner from the whipworm infestation.

Formerly, treatment for this condition was disappointing; these cases failed to respond to thiamin chloride injections, oral anthelmintics, serum therapy, sulfanilamide, castor oil, mineral supplements, and other measures. Recently, however, we have obtained excellent results in eliminating both the whipworms and the barking hysteria by injecting per rectum into the cecum an oily preparation of n-butyl chloride.

One of the clinician's difficult tasks is to sort out the causes (often multiple) of canine hysteria. The author of this interesting report has observed that whipworm infestation causes a specific type of hysteria, and that injecting an oily preparation of n-butyl chloride into the pericecal area per rectum is effective in removing both the whipworms and the resulting hysteria.

Symptoms

The clinician must learn to differentiate between the more common types of nervous symptoms; this is no simple matter without close observation. In whipworm hysteria there is a definite fear complex. If tied near a wall, the dog tries to climb it, wild-eyed, and barking as if in great fright. If allowed to run loose, he tears about in a panicky manner, often urinating in small streams, or attempts to climb into the arms of a person in whom he has gained confidence. The fear subsides temporarily if he is held tightly and patted firmly and friendly. We have never been bitten by one of these dogs. There may be involuntary opening and shutting of the mandible and frothing at the mouth. There are no spasmodic convulsions, such as are seen in meningitis, eclampsia, strychnine poisoning, and occasionally in thiamin deficiency. The dog is able to maintain his balance during the attack.

The owner usually presents the animal just after an attack of fits, barking, nervousness, etc. The dog may not be in a barking mood when brought to the hospital. The diet is usually found to be sufficient in thiamin; there is no history of distemper; the appetite is good—usually too good. It is necessary to hospitalize the dog in order to observe the symptoms.

[1] The author wishes to acknowledge the invaluable assistance of Mr. A. D. Dashoff, technician.

Diagnosis

When the clinical symptoms described appear, a microscopic examination for worm eggs should be made. This requires careful laboratory technic. The sugar flotation method is the most reliable for whipworm ova. Saturated salt solution, which is effective for the ova of hookworms and roundworms and for coccidia, is unreliable for whipworm eggs. The smear method is fairly reliable if the tester is not too hasty in reporting negative results.

Simple syrup should be used for the sugar flotation test. To prepare it, bring 450cc of distilled water to the boiling point and add 850gm of sucrose; continue heating, stirring cautiously, until the sucrose is dissolved and the syrup again reaches a temperature of 100° C. After the solution has cooled, add enough water to make 1000cc of syrup. Preserve by adding 5cc liquefied phenol.

Avoid the use of too much water in softening the feces to prepare them for making the test.

Treatment

The animal need not be fasted nor have the bowel emptied. We use an ordinary enema hose with a metal nozzle and bulb syringe; a horse catheter and dosing syringe would work as well. The hose is lubricated with a water-soluble jelly and inserted into the rectum a distance equal to the distance from the point of the shoulder to the point of the hip. This should bring the nozzle into the cecum, or into the pericecal area, which is sufficient. The free end of the tube is inserted into a 100cc bottle containing the n-butyl chloride solution. By squeezing and relaxing the bulb syringe the solution, together with plenty of air, is forced into the cecum and adjacent bowel. All or almost all of the solution is retained until the cecum is well saturated.

For the n-butyl chloride solution we use ributyl[2] diluted just before using with equal parts of heavy mineral oil. Of this mixture we use one ounce for a dog weighing up to 15 pounds, two ounces for a dog weighing 15 to 30 pounds, and three ounces for a 30- to 50-pound animal.

[2] A preparation of n-butyl chloride manufactured by R. J. Strasenburgh Co.

Treatment of Coxofemoral Dislocation in a Dog

An English setter bitch, 18 months old, was brought to the hospital with a history of having been struck by an automobile 10 weeks previously. Injury to the right hind leg had caused a severe lameness. As the owner lived 50 miles from the nearest veterinarian, he took the dog to a physician who pronounced the ailment a sprain of the leg and hip, prescribing daily massage with liniment. The condition grew steadily worse under this treatment, and the owner took the dog to an osteopath, who decided that there was an injury to the lumbar region with a possible dislocation at that point, causing a partial paralysis of the leg.

The condition continued to grow worse and the dog began to lose flesh. She had a poor appetite and became so weak that after walking a short distance she would lie down and rest. It was then decided to bring her to a veterinary hospital.

On examination the right hip was found so hard and swollen that it was impossible to outline the bony structure by a digital exploration. A tentative diagnosis of dislocation of the head of the femur was made, and the animal was left in the hospital for treatment.

Fluoroscopic examination revealed an extreme anterior dorsal dislocation of the head of the femur. After the animal was anesthetized with ether it required considerable force to break down the several adhesions before it was possible to reduce the dislocation and return the head of the femur to the acetabulum. After this was accomplished, the least movement caused the head of the femur to jump out of position again.

Because of the swelling and the hardness of the muscle tissue around the area involved, it was decided to use the "no-splint method" of treatment. This consists in first relaxing the muscle and tendinous tissues to reduce tension and swelling, then through adjustment and manipulation to build up these tissues to act as a support and protection of the bony structures during the healing process.

While the animal was still under ether the first step in this treatment was taken.

This was to create an extreme posterior dorsal dislocation of the head of the femur. Considerable force was required to bring this about. The reason for creating this posterior dislocation was to bring about a reduction of the swelling, hardness, and inflammation in the group of muscles and tendons involved in the anterior dislocation, and at the same time to start an inflammation which would help develop a stronger support and tension of the opposite posterior group of muscles involved in the injured area.

With the head of the femur still in the posterior dorsal position, the second step was to double the leg to a completely flexed position and to bind it firmly to the body with a two-inch gauze bandage, with pads of cotton so placed under the bandage that the point of the stifle joint pointed inward and slightly downward into the flank. The point of the hock pointed slightly outward and away from the body.

This served a twofold purpose: first, it accustomed the animal to walking on three legs, thus helping to build up her morale and sense of body balance so that she would walk easily without attempting to use the injured leg; second, it changed the whole position of the muscle and tendon structure of the injured area and gave the adhesions which had formed from the anterior dislocation a chance to begin to heal and absorb.

The leg was kept bandaged in this position for two days and the dog was given frequent walks up and down a short flight of stairs and over slightly rough ground to build up her sense of balance on three legs.

On the morning of the third day the bandage was removed, the leg extended and flexed a few times, and the head of the femur easily slipped into position into the acetabulum. This was done without anesthesia; the dog showed no evidence of pain and made no resistance. All the muscle structures in the involved area had become soft and pliable and there was no swelling. The leg could be moved in any direction with no tendency on the part of the head of the femur to slip out of place.

The injured area was gently adjusted and manipulated with the fingertips, the muscles and tendons being placed in their proper supportive positions. The leg was then folded up and left in the flexed position, without bandaging.

For the next five days similar treatments were given to build up the supporting muscle tension and firmness without the development of hardness or swelling. Gradually the manipulation of the leg was increased until it could be moved to any normal position into which it would be likely to be put when walking or running.

At the end of the fifth day of these treatments (the seventh day of hospitalization) the dog was encouraged to place the foot on the ground and to use the leg when walking.

Graduated exercise is an important phase of the no-splint method of treating fractures and dislocations. It is surprising how quickly animals understand that they are to try to use the injured member when they are encouraged to do so. They show unusual courage and maintain their balance in such a way that undue strain on the injured parts is avoided. In cases of leg fractures, it is almost laughable to observe the joy and pride shown by an animal on his first successful attempt to go up or down stairs or jump into a kennel without assistance.

The bitch made a complete and uneventful recovery, and at no time was there any tendency for the dislocation to recur, although the condition had persisted for two and one-half months before the dog was brought for treatment.

C. M. MERRILL.

South Paris, Me.

Dipping Solution for Dogs

℞

Arsenic dip (Wm. Cooper and Nephews) . xxxii
Water ..... Cong. lxiv

Dr. K. U. Jones, Birmingham· Ala., keeps 40 to 50 gallons of this solution in a lard drum. Dogs are dipped in it for fleas, ticks, etc. At some seasons nearly every dog coming into the hospital is infested and all are dipped upon admission to the hospital unless for some reason dipping is contraindicated, when hand application is used.

A Case of Croupous Enteritis In a Stallion

History.—Early in the morning of March 22, 1941, a stallion was found somewhat dull and quiet, but responded as usual on being called. The evening feed of the day before was all consumed. The ration consisted of one kilo concentrate mixed feeds, two kilos mixed hay and one-half kilo tapilan silage. The concentrate mixed feeds intended for mares and fillies had been fed for about two weeks because the supply of oats had been exhausted. The usual amount of water given in the morning was drunk. The regular one-hour exercise was not given that morning because it was showering. After grooming the animal was put in his stall and fed. It was discovered later that the morning feed was untouched.

It was thought probable that the disease was bacterial in origin; or that it was caused by the ingestion of a kind of spiny weed usually found mixed with the hay.

Symptoms.—The animal was closely examined and the following symptoms were found: Complete loss of appetite; high fever —41° C. (106° F.); pulse fast—72 per minute; respiration rapid and irregular—56 per minute; mucous membrane, conjunctivae and nostrils congested; intestinal peristalsis absent; feces scanty, hard and covered with mucus; blood normal; urine scanty and dark yellow in color; no colicky symptoms.

Diagnosis.—At the onset, because of the presence of mucous threads covering the balls of feces, the high fever, the congested conjunctivae and rapid pulse, which are typical of croupous enteritis, the case was diagnosed as such. Intestinal impaction was eliminated because of the absence of colic and negative findings on rectal examination. The pulse, temperature and conjunctivae are usually normal in the early stages of impaction. In croupous enteritis, marked constipation invariably occurs in the early stages.

Treatment.—Lentin, 3cc subcutaneously at 9:30 a. m.

Reaction.—After five minutes there was a profuse perspiration and salivation. The perspiration lasted for almost half an hour and the salivation for one hour. Defecation occurred at 10:30 a. m., 12:00 noon and at 1:30 p. m. The first balls of feces were hard and the last ones were very moist, both covered with mucous threads. From 10:00 a. m. to 1:00 p. m., the animal lay down three times. He urinated at 12:00 noon. From 3:00 p. m. to 7:00 p. m. the stallion was more lively and looked for food. At 4:00 p. m. the temperature was 39.2° C., pulse 36, and respiration 28.

Care and Feeding.—The stallion was provided with thick bedding. Feed was withheld. Water at body temperature was given at 5:00 p. m. with 30cc of a 10% solution of HCl in half a bucketful of water. Rice water was given at 8:30 p. m. and a little guinea grass afterward. The appetite returned.

March 23, 1941

Symptoms.—The animal was quiet and still dull. No bowel movement. Visible mucous membranes still inflamed. Temperature 40° C., pulse 42, and respiration 30.

Treatment.—At 7:00 a. m. an enema of a lukewarm weak solution of potassium permanganate was given. Hard balls of feces covered with mucous threads were removed from the rectum.

At 8:00 a. m., 4cc of lentin was injected subcutaneously in two doses, 2cc each at 20-minute intervals with the idea of getting a prolonged effect.

Reaction.—The same effects were observed, except that the perspiration this time was slight. The animal voided feces three times at 10-minute intervals 20 minutes from the time of injection, and lay down three times. He urinated once at about 11:00 a. m.

In the afternoon, the animal was lively. At 2:30 p. m. the temperature was 39.5° C., pulse 40, and respiration 26. At 5:00 p. m. the temperature was 39.5° C., pulse 42, and respiration 28. He urinated at 4:20 p. m. The urine was of normal color and plentiful.

Feeding and Care.—Feed was withheld. Water at body temperature was given morning, noon and evening. Good bedding was provided as usual. At 5:00 p. m. a little guinea grass was given. The appetite was good.

March 24, 1941

Symptoms.—Same as yesterday. Temperature was 39.5° C., pulse 40, and respiration 26. No bowel movement.

Treatment.—At 6:00 a. m. an enema of a lukewarm, weak solution of potassium permanganate was given. Hard feces covered with mucous shreds were evacuated from the rectum.

This indicates that the effect of lentin is for quick rather than complete relief, as far as the evacuation of bowels is concerned. The cathartic effect is of very short duration. In view of this, I decided to give linseed oil by stomach tube. At 7:30 a. m. the stallion was placed in the stock and 500cc linseed oil was given via stomach tube. At 10:30 a. m. Doctor Munsayac, who had been called for consultation, arrived. The animal was quiet and too lazy to move. The temperature went up to 40.1° C., pulse 50, and respiration 36. At 2:00 p. m. the temperature was 39.1° C., pulse 42, and respiration 28.

Feeding.—Feed withheld; water was given morning, noon and evening.

March 25, 1941

The animal was more lively and responded readily when called. He defecated at about 5:00 a. m. The feces were of better consistency and there was no mucous covering. Temperature 38.3°, pulse 40, respiration 24. Appetite good.

Treatment.—An enema was given as usual and followed by glycerine on the suggestion of Doctor Munsayac.

Symptoms.—At 11:30 a. m. temperature 38.2° C., pulse 40, and respiration 24. Soft feces were voided. Appetite good. Guinea grass was relished.

March 26, 1941

The stallion was very lively, answered call readily. A purgative worked well. Soft feces were expelled. The temperature was normal, 38° C., pulse 36, and respiration 16. Urine plentiful and clear.

The stallion was given a larger quantity of guinea grass and mixed hay, and was discharged as cured. However, the animal is being watched closely. The feed is being increased gradually.

Remarks

1. Lentin is a powerful, rapid-acting cathartic. As such it is strongly indicated in cases where drastic action is urgent, e.g., impaction and acute tympany. Its stimulation of peristaltic action passes quickly.

2. Lentin induces quick, strong and prolonged salivation. Therefore, it should be useful in choke.

3. It causes rapid, profuse and extensive perspiration, hence temporarily lowers a high fever. It might be well to administer it in high temperatures when the patient is liable to have convulsions.

DEMETRIO B. FERNANDEZ.
Urbay, Bohol, P. I.

PECULIAR DERMATOSIS IN SWINE

Apparently there was no significant history connected with the skin sloughs on the pigs shown in the illustration, unless eating the carcass of a dead calf can be construed as having been the cause of such a condition.

The ear and much of the surrounding skin had sloughed away completely in the pig shown in the foreground and, in addition, a chunk of flesh the size of a man's fist was just ready to drop out from below the ear.

The only skin sloughs on the second pig were in the belt, where they were extensive, extending pretty much around the body. The sloughing on top of the shoulders can be seen plainly in the illustration.

These pigs at no time showed lack of appetite nor any elevation of temperature above normal. There was no clinical evidence of erysipelas other than the dermatitis. Both recovered and were sold as healthy hogs. The cause of the dermatitis was not discovered.

Anaplasmosis in Cattle Following Dehorning

Anaplasmosis is a specific disease of cattle. It was first recognized in this country by Kinsley[1]; though the causative organism (*Anaplasma marginale*) was seen and described by Theobold Smith in his classical studies of tick fever (1888-91). Since Kinsley reported it in Kansas it has been diagnosed in at least 24 states, and during the last 14 years has become prevalent among feeder and dairy cattle in the middle west. It is more commonly encountered among adult than among younger cattle.

Anaplasmosis may occur in any of four types: mild, acute, peracute, and chronic. The acute type is the most common.

In December, 1940 anaplasmosis was diagnosed in a herd of 219 feeder cattle near Westphalia, Kansas, 37 days after they had been dehorned; no aseptic precautions having been used. Four steers were dead and eight were sick; a few had been sick for six or seven days. They were three-year-old Hereford range steers weighing approximately 800 pounds and had been grazed on pasture land south of Pawhuska Oklahoma until late in the fall.

Necropsies were performed on two of the dead animals. All of the fat and connective tissues were icteric. The thin, dark brown blood clotted readily with a small amount of clot and a large proportion of serum. A clot the color and consistency of gelatin was found in the carotid artery, extending from the heart anteriorly 12 to 15 inches. The lungs did not show involvement. The condition of the alimentary tract indicated that these animals were constipated. The attending veterinarian made a tentative field diagnosis of anaplasmosis, and samples of blood, heart muscle, liver, lungs, and spleen were sent to a laboratory for microscopic examination.

The sick animals became exhausted easily when exercised and lay down most of the time. When aroused they got up showing a greater than normal tendency to fight. The mucous membranes were pale yellowish white and the hair "stood up" in a rough manner. These animals had depraved appetites and were frequently observed eating dirt. Many of the sick cattle showed an elevated temperature at first, which later dropped to subnormal. It was noticed that all in which the temperature fell much below normal failed to recover. The disease was not definitely diagnosed during in first three days and in the meantime each sick animal was given 700 grains of sulfanilamide daily.

The laboratory reported that small bodies resembling *Anaplasma marginale* were found in the red blood cells. The diagnosis of anaplasmosis being confirmed, sodium cacodylate solution (4½ grains per cc) was administered to the noticeably sick animals. It was recommended that the drug be given intravenously, but the steers were wild and hard to handle and it was therefore considered advisable to make the injections intramuscularly. The site chosen was the side of the neck. The injections were alternated on the sides of the neck, giving 20cc the first day and 10cc each day thereafter for eight consecutive days. Some animals treated over a longer period received a total of 140cc—630 grains of sodium cacodylate.

Every day 10 or 15 additional steers showed symptoms of the disease and were added to the group under treatment. When a total of 78 had thus been assembled, it was decided to treat the entire herd without waiting for the other animals to develop symptoms.

Ten animals died, some of them apparently from exhaustion while being driven from the pasture to the lot for treatment. After the fourth day of treatment most of them showed marked improvement. Usually on the fifth or sixth day the sick animals began eating. All that showed symptoms lost flesh. When improvement set in the animals apparently recovered rapidly.

Sodium cacodylate is commonly used by veterinarians in the treatment of anaplasmosis. It is regarded as giving good results, but this disease should receive additional study in order to find a treatment that is more efficient in alleviating or curing it. No drug has been tried so far that modifies the course of the disease with any degree

[1] Kinsley, A. T., 1925. Fatal disease in cattle. *Vet. Med.* 20:11, pp. 501-502.

of certainty. It has been found that five or six days after the onset of an acute attack the animals either become worse and die or make a rapid recovery, regardless of the medicament used. The outcome is usually determined by the condition of the animal when the acute symptoms appear and the care given it. The energy of the sick animals should be conserved as much as possible. It is best to confine them in a small lot or pen and have feed and water carried to them.

SAMUEL A. SCHENDEL

Richmond, Kans.

* * * *

Non-Inflammatory Swellings In Cattle

The fine grade Jersey cow shown in the illustration developed a large hematoma of the pectoral region. The owner reported that this cow had the habit of riding all cows in heat in the pasture and, after one of these performances the large swelling on her breast was noted.

When I first saw her, I withdrew from the tumor, with a horse trocar, about three or four pints of bloody serum that clotted after exposure to the air.

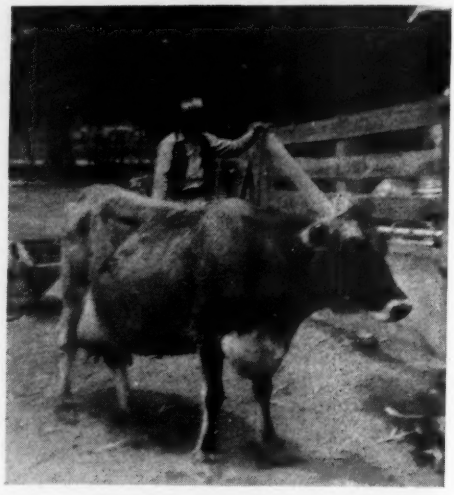
The enlargement was non-inflammatory and apparently inconvenienced the cow only by mechanically interfering with her front legs as she walked. There was no systemic reaction.

A week later I again drew off about the same amount of fluid. After another week an incision was made at the lowest point and antiseptics applied. There was only skin hemorrhage and an uneventful recovery followed.

I have seen three or four similar cases recently. Can you account for them?

Two years ago a colleague and myself saw a herd of cattle in the feed lot with similar swellings on different parts of the body. None were sick. We opened one of the swellings with the same result as in the foregoing case. The others were not punctured. All eventually recovered. What was the cause?—*C. S.*

Comment: Your description reads like that of a bruise. When a similar ailment occurs in a number of animals in the same herd, the veterinarian always looks for a common



The pronounced enlargement in the pectoral region was non-inflammatory, and did not inconvenience this cow except that it interfered with her legs as she walked. After repeated withdrawal of the fluid, the animal made an uneventful recovery. Such swellings are often the result of bruises, caused by kicks or other mechanical injuries

cause. This thing occurs frequently in hogs. Bryant mentions one litter of pigs after another coming down with an unaccountable diarrhea. A search of the hog lot revealed, in an inconspicuous corner, a moist area where the sows had been lying to cool themselves. Further investigation revealed that the moisture was from an outlet from a septic tank, which explained the whole thing and pointed the remedy.

Several lambs were found to have a wound on the side. A careful search of the fence line revealed a piece of wire sticking out at a height to snag them. Team mates suddenly developed a swelling of the withers. The farmer thought they had "thisulo" and called a veterinarian, who discovered a bar across the barn door at a height to strike the withers as the horses went under it.

Maybe there is a young mule doing some plain and fancy kicking around the farm where you and your colleague found several cases.

Degeneration of the Extensor Tendons in Dairy Cows

Case No. 1.—A call was received from a farm in Dickinson County, Kansas, on August 4, 1940, to see a cow that was down and unable to rise.

The affected animal was a Holstein cow seven years of age. She was in good flesh and, according to the owner, had been normal that morning, having given the usual flow of milk. The examination was made in the afternoon at three o'clock.

The animal had been lactating four months after a normal parturition. Her rations consisted of a half gallon of oats twice daily, and a small amount of hay fed while she was in the milking stanchions. She was on a luxuriant pasture of blue stem and buffalo grass, with salt available in the pasture.

The animal showed no symptoms of pain or nervousness and was eating the hay that was placed before her. Rumination was normal; temperature 102.8°F.; pulse 65; and respirations 22 per minute. The visible mucous membranes were normal and the eyes had the alert bright appearance of a normal animal. The Ross modification of the Hayden test for ketone bodies in the urine was negative. The feces were normal.

When urged to rise the animal would break over at the fetlocks on all four feet and fall forward to the ground. The phalanges were contracted but they could be straightened when traction was applied to the hoofs.

Treatment consisted of 500cc of calcium borogluconate given intravenously and one pound of magnesium sulphate in three gallons of water given through a stomach tube. The animal was up and rejoined the herd 15 minutes after the treatment. The owner reported three days later that the animal was normal in every respect including lactation, and had apparently suffered no ill effects from the attack.

Case No. 2.—A call similar to the one reported in Case No. 1 was received on August 12, 1940.

This animal was a Holstein cow 10 years old. She had gone down 10 minutes after being turned out of the barn, only 48 hours after giving the normal flow of milk, but she continued eating the feed placed before her.

The cow had been giving milk for five months after a normal parturition and had been on a pasture of buffalo and blue stem grass but had received no grain or hay rations.

Examination showed that the cow was in poor flesh, the eye bright and the animal alert. However, she would not attempt to rise when urged. The owner reported that on the previous day her attempts to rise had ended in her falling forward onto the ground; the digits breaking over at the fetlock. Rumination was on the average of 1.5 per minute. The feces were slightly dry, but otherwise normal in appearance. The urine was negative to the test for ketone bodies. Pulse, temperature and respiration were normal.

This animal had suffered a like attack five months after a previous parturition, but had recovered after intravenous treatment of calcium borogluconate. In the present attack the animal failed to respond to the calcium borogluconate-magnesium sulphate treatment, and 500cc of dextrose was then given intravenously.

Five hours later the owner reported that the animal had died, although she had been eating 20 minutes before her death.

On necropsy no visible lesions were found on the intestinal viscera. On examination of the limbs the extensor tendons were found to be degenerated at the points of attachment to the phalanges. The tendons were shrunken, torn, shredded and white in color.

There have been many similar cases in this locality in high milk producing cows from three to 10 years of age. To date all animals have recovered from the first attack. Three animals have been treated for a second attack, from which they did not recover. None have responded to treatments for mineral and vitamin deficiency. The above three animals showed no lesions post mortem other than the degeneration of the extensor tendons.

The condition of the tendons found on necropsy would perhaps support a diagnosis of calcium deficiency but in itself is not

sufficient for such a diagnosis. A diagnosis of nutritional deficiency is based upon exclusion but is largely negatived by the history; i.e., the ration was not one upon which an acute deficiency should develop.

W. G. TROSTLE

Hope, Kans.

Nymphomania in Dairy Cattle Treated with Corpus Luteum Extract

Nymphomania occurs in all domestic animals. The condition is probably of greatest economic significance in the dairy cow, since it usually affects high producers. It may occur in non-pregnant heifers, but is encountered most frequently in young cows which have calved less than four times. Aside from the loss in milk production, affected cows are a nuisance to the other cattle in the dairy herd.

The commonest cause is a cystic ovary possibly due to an endocrine upset.

Four cases of nymphomania were treated with corpus luteum extract during the last year: a Jersey heifer, three years old; a Holstein cow five years old; and two Jersey cows, five and five and one-half years old, respectively. All showed the following symptoms: irregular or continuous heat periods, decrease in milk flow, excitability, and irritability.

Each animal was given 10cc of corpus luteum extract intramuscularly twice a week for four to six weeks. At the end of this period, all were having regular estrual periods and the symptoms of nymphomania had disappeared.

There are several commercial corpus luteum extracts, but we prepared our own from the expressed corpora lutea from ten pounds of ovaries obtained from the packinghouse. These were ground up fine and placed in a sterile flask. One cc of sterile saline solution was added to each gram of corpus luteum. To every 1000cc of saline solution was added 10cc of formalin. This mixture was placed in a refrigerator for one week, being agitated every day. The fluid was pressed out and let stand for 24 hours. The supernatant fluid was then drained off ready for use.

CHARLES L. SMITH

Saginaw, Mich.

Compound Fracture in a Horse

February 19, 1941, a two-year-old gelding with a compound fracture at the distal epiphysis of the tibia was presented for treatment. Two days previously the owner had noticed that the animal did not bear any weight on the affected limb. At that time the fracture was simple, but during transit that part of the tibia just proximal to the fracture punctured the skin on the medial surface of the leg slightly above the hock joint.

The fracture was reduced and a galvanized iron splint was applied with cotton and bandages in such a manner that the bandage holding the splint did not cover the wound. After the leg was set the animal was placed in slings. An initial dose of 600 grains of sulfanilamide was given per os; this was followed by eight daily doses of 300 grains each. A dry sulfanilamide pack was applied to the wound until suppuration ceased. At four-day intervals the wound was swabbed with cotton saturated with tincture of iodine to stimulate the formation of granulation tissue.

During the course of the treatment the animal ate well and showed a normal temperature. The splint was removed March 22 (after 31 days), at which time the horse was able to bear some weight on the injured leg. Two days later the animal was destroyed since it was a poor specimen and the owner did not consider it worth the cost of care pending problematical recovery.

On post-mortem examination the affected limb showed a well developed callus at the site of the fracture. A large amount of inflammatory tissue was present in the vicinity of the wound.

Remarks.—The objective in treating this animal was to determine the response of a compound fracture in a horse to treatment. Undoubtedly the youth of this animal was largely responsible for the favorable reaction to the treatment. In the case of a valuable sire or brood mare it would probably be profitable to treat a compound fracture.

CHARLES C. NEWHART

Delaware Water Gap, Pa.

Pyometra and Oophoritis in a Bitch

A fat, aged brindle Boston bitch, weighing about 30 pounds, was presented for treatment with a history of several recent attacks of convulsions. The bitch had never been bred. Temperature, pulse and respiration were normal. Upon examination a large, firm mass almost the size of a baseball could be palpated in the abdomen. A tentative diagnosis of tumor was made, and laparotomy for the purpose of surgical removal was advised. This was refused by the owner.

A week later the bitch was again presented because a purulent vaginal discharge had developed. A diagnosis of pyometra was made and oophorohysterectomy was recommended.

The standard median line spaying operation was performed under ether anesthesia. An unusually long incision was made. When the horns of the uterus were brought up through the opening, both were found to be distended and enlarged, and the left ovary was greatly enlarged. Both ovarian attachments and the stump of the body of the uterus were ligated with No. 2 catgut. The end of the stump was painted with liquefied phenol and then inverted by suturing to prevent the spread of infection from the uterus. The incision was closed with simple interrupted sutures of silk through the skin, fascia, muscle, and peritoneum. A pack of antiseptic dressing powder was applied and the wound bandaged. The incision was treated daily with an antiseptic powder and kept bandaged. The sutures were removed the fifth day. Recovery was uneventful.

Upon examination both horns were found to contain large amounts of pus in numerous sacculations, while the walls of the uterus were greatly thickened and indurated.

The right ovary was apparently normal, with much fat deposited around it and in the broad ligament. The left ovary was enlarged to a diameter of approximately two inches, and there were several small cysts on the surface. Upon incising it, much of the tissue had the appearance of a carcinoma with areas of old hemorrhage; however, upon sectioning and microscopic examination, this tissue was found to be an inflammatory process with a prolific cellular infiltration of polymorphs, plasma cells, lymphocytes, monocytes, and a slight increase in supportive connective tissue. The condition was diagnosed as salpingitis and oophoritis, an ascending type of inflammation from the uterus having occurred.

L. R. BAIN

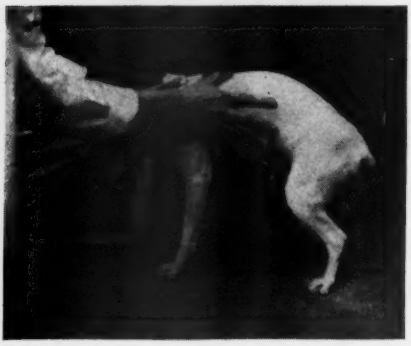
Pittsburg, Kans.

A Successful Operation for Perineal Hernia

A 15-year-old male fox terrier affected with perineal hernia was presented for treatment December 4, 1940. The hernia had been noticed early in the summer and had been growing larger. At this time the only ill effect on the patient was constipation, which was relieved with a low enema. The owner was advised to give one tablespoonful of mineral oil on the feed once a day. The patient was presented subsequently at intervals of twice a month for relief of constipation. By March 15th the hernia was approximately twice as large as when first seen. On March 28th the patient was struck by a car and was brought in for observation. On the following day there was a marked dysuria. After replacement of the hernial contents, the patient urinated normally, indicating that the bladder had been everted into the sac and that the uretha

had been obstructed by the pressure of the twist.

On April 18th an operation to correct the



hernia was performed. The abdomen was scrubbed, shaved and painted with tincture of iodine, the bladder evacuated, and a sterile cloth placed over the abdomen and clamped on with towel forceps. The incision was made one inch anterior to the brim of the pelvis and one-half inch lateral to the penis and extended anteriorly three and one-half inches through skin, muscle and peritoneum. Hemorrhage was controlled by grasping the bleeding vessels with small artery forceps. The bladder was pulled upward to expose its suspensory ligaments (reflections of the peritoneum from the rectum. These form a cul-de-sac through which the bladder had been everted posteriorly and subsequently into the hernial sac). Two interrupted sutures of No. 1, 20-day catgut were used to bring the ligaments together and thus partially close the fossa. Care was taken to avoid injury to the ureters. The rectum was sutured to the right abdominal wall, using two interrupted sutures of No. 1, 20-day catgut. The bladder was tied to the left abdominal wall with the same type of suture material. The sutures in the bladder and rectum did not penetrate past the serosa. The abdominal incision was closed with continuous sutures of chromic catgut in the muscle and peritoneum and interrupted sutures of silkworm gut in the skin. One cc of Lugol's solution was injected into each of three separate areas in the hernial sac. Although the patient suffered little hemorrhage during the operation, 20cc of normal canine serum was administered intravenously. April 23rd the silkworm gut sutures were removed and the patient was discharged.

One week later the hernial sac had almost completely atrophied and the owner reported that the animal had shown no signs of discomfort.

HAL EYESTONE

Pittsburg, Kans.

Hermaphrodite Dog

Some time ago a dog was brought in which unquestionably was a hermaphrodite. According to the owner, its behavior alternated

between masculine and feminine. No testicles were present in the scrotum. The sheath was in its normal position, but seemed to have the characteristics of the vulva. On examination no penis was found. Since the dog was brought in for euthanasia, this was carried out and a postmortem examination was made. This revealed one subnormal fallopian tube, which was traced to a very undeveloped ovary, three times the size of a pinhead. The second fallopian tube could not be found.

I. J. SADOW

Chattanooga, Tenn.

Abstracts

Influence of Vitamin E on Brucella Infection in Swine

A relationship between vitamin E deficiency and *Br. abortus infection* has been suggested. Lentz[116] tested the effect of the injection of wheat germ oil on 15 pigs, using 14 controls. All were infected with *Br. abortus*. In the treated group there were four abortions, as compared with nine in the untreated group. Lentz concludes that vitamin E raises resistance to natural Brucella infection.

Treatment of Broken Wind by Pneumothorax

A. Paabo[111] treated broken wind in 39 horses by making 64 insufflations of air into the pleural cavities. All these cases occurred without any undesirable disorders of the heart or circulatory system, except for some functional disturbances such as heart weakness and disordered rhythm; extrasystoles, or increase in the pulse rate, usually disappeared within 30 minutes. In one case the extrasystole ceased after about four hours and another after six hours. The accentuation of the second heart sound decreased or even ceased, under the influence of insufflation.

In one of the two horses where the heart missed every fourth beat, the intermittency after collapse therapy was 2 to 3 beats every two minutes, in the other horse the normal action of the heart was restored. Exact diagnosis of the functional heart disorders is only possible by use of the cardiograph.

After insufflation of air into pleural cavities in horses Paabo measured the increase of the pulse rate and the number of respiratory movements during the time when the intrathoracic pressure was equal to zero. By insufflation of air into the right pleural cavity, the pulse rate increased by 9.13 beats, and the number of respirations by 9.00 per minute; by the same treatment of the left lung the corresponding increases were 9.1 and 6.33 per minute respectively. The average value of the intrathoracic pressure after the treatment was + 3.44mm Hg in the right pleural cavity, and + 3.95mm Hg in the left.

Cannibalism in Laying Hens

The recommendations made by Van Heelsbergen and Miller and Bearse with a view to stopping or preventing the vice of cannibalism were put into practice in the establishments controlled by the author,[112] but all proved unsuccessful. The application of Knowles' theory, that the supply of cereals fed to the birds should be strictly limited, was followed by a spectacular cessation of cannibalism in the flocks where the condition had been rampant for years and where the birds had been receiving an unrestrained grain supply.

Mustard Gas and Army Animals

Because of its relative chemical stability and its power of solubility and penetration, protection against mustard gas is very difficult.[113] The action on tissue is that of a cell poison resulting in necrosis. A distinction is drawn between the effects caused by the liquid gas and the vapor; the action of the latter when encountered in field concentrations is weak except upon the eyes. Drops of the liquid gas falling on the skin cause the appearance of tufts of erect hairs, followed by edema, superficial necrosis, and the gradual sequestration of the dead portion of the skin. Decontamination (first aid treatment) aims at neutralizing and removing the poison before it is completely absorbed by the skin. The success of this early treatment depends upon the speed with which it is employed after contamination, and many practical difficulties must be expected. The mule is more sensitive than the horse to mustard gas, and also less tolerant to bleaching powder applied either as a watery paste or as an ointment. The camel is relatively tolerant.

[116] Lentz, W., 1939. Erfolgreiche Beeinflussung der Brucellainfektion bei Schweinen durch Injectionen von Weizenkeimöl "Enoulan." Berl. Münch. tierärztl. Wschr., Feb. 24, pp. 120-121. Abst. in *Vet. Bul.* 11:6, p. 398.

[111] Paabo, A., 1940. Terapeutilise pneumotooraksi toimest vereringesse ja muid tähelepanekuid hobuste kroonilise kopsualveolaaremfüseemi ravimisel. *Eesti loomaarstl. Ring.* 16, pp. 15-28. Abst. in *Vet. Bul.* 11:6, p. 402.

[112] Von Ebbell, H., 1939. Ueber den Kannibalismus bei Legehennen. *Arch. Geflugelk.* 13, pp. 357-361. Abst. in *Vet. Bul.* 11:6, p. 393.

[113] Bamford, R. M., 1940. Mustard gas and army animals. *Jnl. Roy. Army Vet. Cps.* 11, pp. 113-128. Abst. in *Vet. Bul.* 11:6, p. 405.

Chemotherapy of Gas Gangrene

Sulfanilamide, sulfapyridine and sulfathiazole were found to be of great value in preventing the development of gas gangrene produced by *Clostridium welchii, Cl. septique,* and *Cl. oedematiens* in mice, provided that they were administered locally in large quantities and soon after infection.[113] All three drugs were found to have much the same value against *Cl. welchii* infections, but sulfathiazole was of greater value than the other two against *Cl. septique* and *Cl. oedematiens.*

Local Application of Sulfonamide Compounds to Prevent Gas Gangrene Infections

Experimental wounds (with crushed muscle and the presence of a foreign body) were made in guinea pigs, and large numbers of gas gangrene organisms were inserted; untreated animals died within 24 hours.[117] Application of sulfonamide compounds (sulfanilamide, sulfapyridine, sulfathiazole) to the wounds at the same time as insertion of organisms saved a large proportion of the animals infected with *Clostridium welchii* and with *Cl. septique,* but had only slight influence on infections with *Cl. oedematiens.* Sulfathiazole was the most effective compound and local application to the wound was more effective than intraperitoneal injection. Sulfanilamide was absorbed from wounds very quickly (in less than 24 hours), giving a high but transitory concentration in the fluids of the wound; sulfapyridine was absorbed slowly from the wound (in seven to 10 days) and its concentration was low; sulfathiazole occupied an intermediate position. The development of infection in these wounds could also be prevented by the administration of antitoxin. It is recommended that war wounds should be protected against the development of gas gangrene by the local application of sulfonamide compounds together with the injection of antitoxins.

[113] McIntosh, J., and F. R. Selbie, 1941. Chemotherapy of gas gangrene. *Lancet.* 240, pp. 240-242. Abst. in *Vet. Bul.* 11:6, p. 398.

[117] Hawking, F., 1941. Prevention of gas gangrene infections in experimental wounds by local application of sulphonamide compounds and by sera. *Brit. med. Jnl.* Feb. 22, pp. 263-268. Abst. in *Vet. Bul.* 11:6, p. 398.

Treatment of Equine Purpura with Calcium Chloride

Purpura or morbus maculosis has been regarded as a secondary complication to some other disorder, although its etiology is unknown. Brüstle's observations[118] hardly bear this out. It is characterized by petechiae in the skin, subcutaneous tissues, and mucous membranes and is often accompanied by edematous swellings in various parts of the body. Marek initiated the treatment of this disease with calcium chloride. Brüstle confirmed its beneficial effect in three horses, using a 7.5% solution injected intravenously, definite improvement being seen within three days after treatment was begun.

Meat and Food Inspection in Sweden

The larger towns in Sweden have public slaughterhouses, and any town with a population of over 4,000 must have a meat inspector.[114] There are 170 meat inspection control stations in the country where meat is inspected and stamped. All are under the authority of the Department of Agriculture.

Milk and cream are subject to sanitary control. Cows, cowsheds and dairies are inspected, and a medical inspection of personnel handling milk is provided. All milk and cream from other than tuberculin-tested herds must be pasteurized prior to sale for human consumption. Standards of cleanliness and structural standards for buildings are provided in the official regulations.

Fish, game and poultry also are subjected to inspection. Laboratories are provided in the large towns. It is stated that since the inception of the various orders and regulations for inspection of meat and milk, human infection from animal sources has diminished considerably.

[118] Brüstle, 1940. Beitrag zur Behandlung des Petechialfiebers der Pferde mit Calcium chloratum. *Z. Veterinärk.* 52, pp. 25-40. Abst. in *Vet. Bul.* 11:6, pp. 402-403.

[114] Sandberg, I., 1939. Veterinary meat and food inspection in Sweden. *Z. Fleisch-u. Milchhyg.* 50, pp. 7-9. Abst. in *Vet. Rec.* 53:19.

Book Reviews

Plague on Us. *By Geddes Smith.* Cloth bound; 365 pages, illustrated. The Commonwealth Fund, New York, 1941. $3.00.

This is a beautiful book. The commonly misapplied and much overworked term "beautiful" is used advisedly, because here it fulfils exactly the dictionary definition: "Exciting pleasure in the higher faculties of sense perception, or analogously in the mind." The author's clear, fluent style; his grasp of the various ramifications of his subject; his intelligent evaluation of a mass of data, are complemented by the artistic near-perfection of the volume from a purely mechanical standpoint.

The work, written for the intelligent layman, deals with the history of the pestilences which have visited mankind; with the progress which has been made in understanding and fighting them; with the problems and methods of modern epidemiology; and with the nature and magnitude of the job of conquering man's parasites (a term which the author uses in a broad sense to refer to all the agencies of infectious disease, from the poliomyelitis virus to the tapeworm).

Enthralling as are the accounts of the great historical plagues, and fascinating as are the epidemiological "detective stories" in Chapter 7 (the case of the Methodist ladies, the case of the ladylike oysters, etc.), the chief interest and value of the book lie in the clear picture it gives of the fundamental principles of infectious disease control.

Those who become jubilant over the development of a serum, vaccine or drug specific for a given disease will be sadder, and presumably wiser, after reading *Plague on Us.* These and most of the other methods which have been devised for disease control are but pebbles thrown in the path of the juggernaut of disease. Occasionally, by luck or good management, they may be so strategically placed as to divert it from its course, to the advantage of the individual and sometimes of the group; but in order to halt the onward roll of the juggernaut, we need to throw, not pebbles in its path, but a monkey-wrench into its works. That requires a knowledge of its works, the possession of a suitable monkey-wrench, the strength to throw it, and the aim to throw straight. And so far, we do not possess all these necessary qualifications for even one disease, although in some cases we have laboriously acquired one or two of them.

It may well be, as the author points out, that our present relative freedom from the terrible plagues of the past is due not so much to our efforts at eradicating them as to a natural regression. "Epidemic diseases are always in unstable equilibrium, rising and falling like waves even if nobody does anything about them, and what we take to be a triumph or failure of preventive medicine may be only a ground swell in the natural history of the disease."

The bright side of all this is, of course, that the judicious placing of pebbles is considerably better than nothing at all, particularly from the viewpoint of the individuals concerned; and that we are slowly building up the knowledges and technics which will enable us to take more effective steps.

It is interesting, and perhaps significant, that nowhere in the book does the word "veterinary" or "veterinarian" occur. In a sense, there is no reason why veterinary medicine as such should be mentioned in a book dealing with human disease, and written from the point of view of what "we"—the human race—are doing about it, rather than what contributions any specific profession is making.

But, as the author himself recognizes, the problems of human disease are bound up intimately with the problems of animal disease. In the long run, it is impossible to control one without controlling the other: both because many disease entities are common to animals and man, and there is the ever-present possibility that others will become so; and because the as yet little understood phenomenon of "resistance" is indissolubly bound up with the almost equally little understood process of nutrition—and human nutrition rests, directly or indirectly, upon the health of domestic animals.

It seems, therefore, that one of the most potent weapons against disease would be a close understanding and cooperation be-

tween epidemiologists and epizootiologists. That such close understanding and cooperation do not exist is implied by Mr. Smith's impression of such matters as, for example, the control of bovine tuberculosis in the United States, to which he refers almost negligently in such terms as: "Tuberculous cows have been largely weeded out of American dairy herds." To imply that the weeding out of tuberculous cows is a simple matter is as naive as to say that the control of human tuberculosis merely requires the segregation of tuberculous individuals. In both cases, it is the method of accomplishing the job that is important. It has been pointed out by an eminent member of the medical profession, J. Arthur Myers, in *Man's Greatest Victory Over Tuberculosis,* that many of the technics worked out by the epizootiologist could well be adopted by the epidemiologist; he says bluntly: "Human medicine is 40 years behind veterinary medicine in the tuberculosis control program."

Of course, it is conversely true that veterinary medicine could profit to a much greater degree than it does from the lessons of human medicine.

It would be absurd to say that no cooperation at all exists between the two, or that the members of one profession are blankly ignorant of the other. But it is obvious in reading such books as *Plague on Us* that a much closer cooperation between them would work to the advantage of both. Such tough problems as influenza (one of the major items in Mr. Smith's list of "unfinished business"), and many others, will probably never be solved until that cooperation is achieved.

You may obtain any book reviewed in this department by remitting the published price to the Book Department of VETERINARY MEDICINE, 7632 S. Crandon Ave., Chicago, Ill.

A Surgeon Reflects. *By James Thomas Nix.* Cloth bound; 115 pages. Louisiana State University Press, 1941. $1.50.

Those who enjoy reading informal observations on life mixed with bits of homespun philosophy should appreciate this series of essays by a doctor, based on 30 years' experience as a practicing surgeon. Never profound, Doctor Nix's reminiscent ramblings have the appeal of simplicity and directness.

* * * *

The Bureau of Animal Industry and Its Work, by John R. Mohler, Chief of the Bureau of Animal Industry, is a 21-page pamphlet issued by the U. S. Department of Agriculture "for the information of the public and especially for persons engaged in live stock work." It describes tersely the purposes and organization of the Bureau, and outlines the duties and activities of each of the divisions. A brief note on personnel emphasizes the fact that the professional personnel consists largely of graduate veterinarians "skilled in the diagnosis of animal diseases, in the application of preventive measures in the field, in work involving laboratory investigations, and in the detection of abnormal conditions in meat-producing animals at time of slaughter."

* * * *

Community Organization for Health Education, the report of a committee of the Public Health Education Section and the Health Officers Section of the American Public Health Association, is a 120-page booklet outlining the problem of effective organization for health education in a community, describing in detail several county and state programs now in operation, recording certain fundamental principles thus brought to light. It should be of value to those interested in or responsible for community organization in this respect; a category including not a few veterinarians acting on local school boards or boards of health. Copies of the report may be secured from the American Public Health Association, 1790 Broadway, New York City, by forwarding 9 cents in stamps for each copy desired; lots of 20 copies will be sent by the Association, express collect, upon receipt of 30 cents in stamps to cover cost of wrapping.

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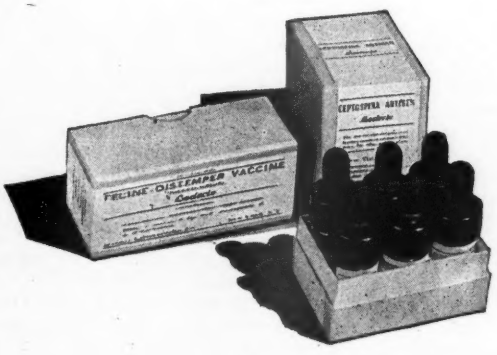

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Among the dozen or so visitors from afar seen at the A. V. M. A. meeting at Indianapolis last month were Drs. Rafael Lagarde, Havana, Cuba; Francisco Menendez, San Juan, Puerto Rico; Henry Charles Burns, of Nassau, Bahamas; and Guy A. Roberts, Ciudad Trujillo, D. R. . . . Doctor Roberts (who, by the way, contributes an interesting article on paraplegia in cattle to this issue) presented a paper on common tropical diseases of animals at the meeting. . . . . Doctor Lagarde, who is professor of veterinary medicine at the University of Havana, asked us to extend a cordial invitation from him to any veterinarians planning to visit Cuba.

■

As we go to press, we receive word that Dr. Guy A. Roberts died suddenly of apoplexy on August 24th, shortly after his return to Ciudad Trujillo from the A. V. M. A. Meeting.

■

A tailless colt, born a few months ago on the farm of Dr. C. H. York near Holmesville, O., excited so much comment in that vicinity that Congressman W. R. Thom, who represents that Ohio district, sent a picture of the animal to Dr. John R. Mohler, Chief of the Bureau of Animal Industry, U. S. Department of Agriculture, requesting an explanation of the condition. According to the Cleveland *Plain Dealer*, Doctor Mohler agreed that the colt's complete lack of tail was a rarity, and opined guardedly that it was due "either to mutation which could be passed on to succeeding generations or to some abnormality in embryological development."

■

Cannibalism is a recurrent problem in many poultry flocks. . . . Two answers to the problem, based on controlling the feed, are suggested in this issue (see pages 489 and 533). Some other solutions are purely mechanical, their object being to make the chickens "see red" so that they cannot distinguish blood on the feathers or in the shaft at the base of new feathers. On the W. L. Tallmadge farm near Lynxville, Wis., this is accomplished by fitting the flock (comprising about 100 white hens) with rose-colored glasses. The spectacles have red celluloid lenses set in aluminum bows, and are held in place by means of a tiny aluminum bar through the nostrils. . . . The same principle is utilized by the Washington Agricultural Experiment Station, which has found the use of red light effective for preventing cannibalism among chicks in batteries or in brooder houses. The windows may be painted with red lacquer, or outside light may be eliminated and ruby-colored electric light bulbs used.

More than 3,000,000 corn cob pipes were sold last year. The old cob pipe has gone modern —plastic lining in the bowl, 'n' everything!

■

According to *Science News Letter*, the oldest record of physicians blaming bodily ailments on bad teeth is in an Assyrian manuscript of the seventh century B.C.

■

It sounds almost too good to be true, but it is reported that a terra cotta slab, dating from the fifth century B.C., bears an Etruscan inscription to the following effect: *"Agrios and Lati, our delegates to the meeting of the League of the World, which abolished and outlawed war from the earth for all time, returned home."* . . . It seems a pity that, while we can derive amusement and instruction from the doings and sayings of the ancients, they do not have the reciprocal privilege of enjoying ours. . . . An Egyptian newspaper once had the same feeling about this, when Clemenceau, visiting Egypt for rest and recreation after World War I, commented unfavorably on the pyramids, as representing a colossal waste of human energy. The newspaper suggested that some enterprising medium get in touch with the spirit of Cheops and learn *his* frank opinion of the Treaty of Versailles.

■

Common table salt is finding a wide variety of uses these days. . . . It has been employed for years as a vehicle for iodine in the so-called goitrous regions. A more recent human application is as a preventive of heat prostration; most well-run industries now supply salt tablets along with drinking water for their employees during the summer months. . . . In the veterinary field, salt has been found useful in controlling cannibalism in chickens (see page 489). Perhaps its most spectacular veterinary application is the recently-developed treatment for enteritis in swine (see pages 495-499). In spite of the lack of a documented scientific explanation for its effectiveness in certain enteric diseases, the "salt" treatment continues to gain adherents. . . . Dr. T. L. Steenerson of Wilkinson, Ind., says that until something better can be found for treating hemorrhagic dysentery of swine, segregation and sanitation, plus the feeding of salt-soaked oats, offer the most promising results. He uses three pounds of saturated salt solution and one-half pound of alkaline powder to each five gallons of oats; like other users of the salt treatment, he stresses the necessity for an unlimited supply of fresh drinking water—not more than 50 feet away, he says. . . . . An army veterinarian reports the treatment of 42 cases of heat exhaustion in a single night with hypertonic saline solution, with recovery in all cases.

Coming Meetings

Eastern Iowa Veterinary Association, 28th annual meeting, Hotel Montrose, Cedar Rapids, Ia., October 7-8.

Maine Veterinary Medical Association, quarterly meeting, Lewiston, Me., October 8.

University of Illinois 22nd annual veterinary conference, new Union Building, University of Illinois, Urbana, Ill., October 14-15.

American Public Health Association, Convention Hall, Atlantic City, N. J., October 14-17. (For information about this meeting address the A. P. H. A., 1790 Broadway, New York, N. Y.)

Purdue University Short Course for Veterinarians, Lafayette, Ind., October 15-17.

Pennsylvania State Veterinary Medical Association, 59th annual meeting, Harrisburg, Pa., October 23-24.

Southern Veterinary Medical Association and Florida Veterinary Medical Association (joint meeting), George Washington Hotel, Jacksonville, Fla., October 27-29.

Mississippi Valley Veterinary Medical Association, Hotel Custer, Galesburg, Ill., November 13-14.

■

Veterinarians of Texas, Arkansas, Oklahoma and Louisiana met at the A. V. M. A. convention August 14th, and decided to hold

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a joint meeting of the four states at College Station, Tex., in June, 1942. They plan to organize a Southwestern Veterinary Association, the annual meetings of which will take the place of the semi-annual meetings held individually by the associations of these four states in the past.

■

Army Veterinary Service

Transfers.—Col. Jean R. Underwood, from the Philippine Department to Letterman General Hospital, Presidio of San Francisco, Calif.; Lt. Col. Irby R. Pollard, from South Central Remount Area, San Angelo, Tex., to Eighth Corps Area Service Command, Fort Bliss, Tex., Aug. 1; Lt. Col. Burlin C. Bridges, from Front Royal Quartermaster Depot, Front Royal, Va., to East Central Remount Area, Lexington, Ky., Sept. 1; Lt. Col. Kenneth E. Buffin, to Fort Belvoir, Va., on his return from foreign service, instead of to Fort Mason, Calif., as previously ordered; Lt. Col. William R. Wolfe, from Fort Oglethorpe, Ga., to Front Royal Quartermaster Depot, Front Royal, Va., Sept. 1; Lt. Col. Frank H. Woodruff, from Fort Sill, Okla., to Fort Oglethorpe, Ga., Sept. 1; 1st Lt. Harry J. Robertson, from Mitchel Field, N. Y., and temporary duty at Fort Dix, N. J., to the 208th General Hospital, Fort Devens, Mass., Aug. 20.

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Veterinary Corps Reserve

Promotions.—To Major: Capt. Leo A. Hock, Aug. 1; to Captain: 1st Lts. Joseph J. Merenda, May 7; Henry R. Schrumpf, July 3; Howard E. McCutchan, July 11; Manuel C. Kastner, July 29; Hugh D. Smith, July 31; Charles R. Wainwright, Aug. 18.

Transfers.—Maj. Norman J. Pyle, from Fort Sam Houston, Tex., and temporary duty at the Army Medical Center, Washington, D. C., to Army Medical Center, Washington, D. C., Sept. 1; Capt. Arthur R. Thiele, from Fort Wadsworth, N. Y., to Jersey City Quartermaster Depot, Jersey City, N. J., Aug. 15; 1st Lts. James G. Anderson, from Philippine Department to New York Port of Embarkation, Brooklyn, N. Y.; Clyde I. Boyer, Jr., from Army Medical Center, Washington, D. C., to Fifth Corps Area Laboratory, Fort Benjamin Harrison, Ind., Sept. 15; Clement I. Angstrom, from present assignment and duty at Fort Monmouth, N. J., to the Pigeon Breeding and Training Center at that station; Tyler J. Young, from Army Medical Center, Washington, D. C., to the Fourth Corps Area Laboratory, Fort McPherson, Ga., Aug. 10; Jacob H. Ricker, from Fort Wadsworth, N. Y., to Jersey City Quartermaster Depot, Jersey City, N. J., Aug. 20.

Ordered to Extended Active Duty.—Maj. Lewis H. Moe, Stillwater, Okla., to San Antonio General Depot, Ft. Sam Houston, Tex.,

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July 28; 1st Lt. Clinton L. Gould, Fort Missoula, Mont., to Air Corps Basic Flying School, Bakersfield, Calif., Aug. 27.

Meat Inspection Course.—The following officers, now on active duty, are ordered to report at the Chicago Quartermaster Depot for a 30-day course of instruction in the inspection of meat, meat-food, and dairy products:

Commencing July 17: Maj. Hans J. Magens, Division Veterinarian, 2nd Div., Ft. Sam Houston, Tex.; Capts. Elmer F. Finke, Camp Forrest, Tenn., and Ashley J. Joyner, Camp Stewart, Ga.; 1st Lts. Donald V. Hughes, Manchester Air Base, Manchester, N. H., Howard C. Poulin, Fort Adams, R. I., Lucien P. Bailey, Camp Lee, Va., Ross T. Mickle, Fort Myer, Va., Robert Tolley, Fort Monroe, Va., Eldred W. Exley, Camp Wheeler, Ga., Ralph H. Wadsworth, Willard H. Strawn, and William L. Lukens, Fort Knox, Ky., Norman H. Stoner, Selfridge Field, Mich., James P. Crawford, Savanna Ord. Depot, Proving Ground, Ill., Alpheus H. Seeley, Randolph Field, Tex., Merle L. Farris, 69th Quartermaster Co., Camp Claiborne, La., C. B. Randall, 68th Quartermaster Co., Camp Livingston, La., Herbert P. Bolks, Boise Air Base, Boise, Idaho, James A. Eskeldson, Fresno Air Base, Fresno, Calif., Joseph H. Berger, Sunset Field, Calif., and Theodore M. Barr, Ft. Sheridan, Ill.

Commencing September 2: Capt. Robert N. Earhart, Kelly Field, Tex.; Maj. Xenophon B. Shaffer, Fort Sheridan, Ill.; 1st Lts. Sidney L. Kaplan, Camp Edwards, Mass., James A. Brennan, Madison Barracks, N. Y., Robert O. Allen, Fort Ontario, N. Y., Raymond B. Church, Fort Wadsworth, N. Y., Guy F. Abell, Langley Field, Va., Marion W. Scothorn, Carlisle Barracks, Pa., Arthur N. Gorelick, Fort Eustis, Va., George D. Batchelder, 28th Quartermaster Co., Camp Livingston, La., Robert L. Willis, Camp Stewart, Ga., Paul E. Boyer, Ft. Benj. Harrison, Ind., Warren Smeltzer, Chicago Quartermaster Depot, Chicago, Ill., Charles W. DeLand, Chicago Quartermaster Depot, Chicago, Ill., Clarence K. Bennett, Fort

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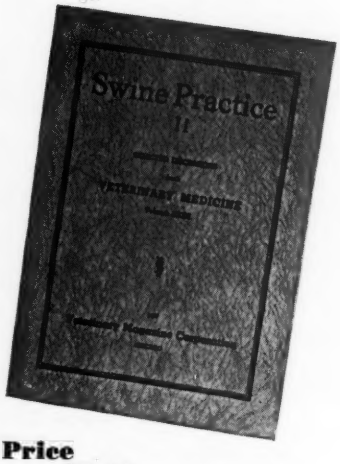

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National Guard

Temporary Promotions.—To Colonel: Lt. Col. Lloyd M. Friedline, Aug. 2; to Lieutenant Colonel: Majs. Loye J. Lauraine, July 21, Joseph M. Curry, Aug. 2, and Algernon H. Kerr, Aug. 11; to Captain: 1st Lt. Allen S. Van Sant.

■

Deaths of Veterinarians

J. S. Donald, 88, Bay City, Mich., Ontario Veterinary College '89, practiced in Bay City over 50 years, May 18.

B. F. Ward, Sr., 81, Glenwood, Ia., Chicago Veterinary College '94, practiced at Morris, Ill., coming to Glenwood in 1914, June 6. Of Doctor Ward's five children and ten grandchildren surviving, two sons (B. F. Ward, Jr., Anthon, Ia., and F. G. Ward, San Diego, Calif.) and one grandson are veterinarians, and two other grandsons are studying for that profession.

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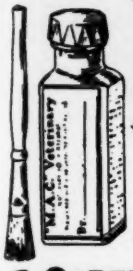

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Herbert B. Chaney, 69, Denver, Colo., Ontario Veterinary College '97, practiced in Akron, O., and later was in B. A. I. service for 18 years, June 10.

Charles E. Brownback, 70, Springfield, Ill., Chicago Veterinary College '96, practiced in Springfield over 40 years, June 19.

H. E. Steig, Minneapolis, Minn., June 24.

Edward L. Thornton, 56, Canaan, Conn., U. S. College of Veterinary Surgeons, practiced in Canaan 25 years, July 1.

H. L. Feistner, Auburn, Nebr., Kansas City Veterinary College, former Nebraska State Veterinarian, July 4.

James B. Higgs, 63, Caro, Mich., Grand Rapids Veterinary College '14, July 23.

F. A. Hugins, 61, Omaha, Nebr., George Washington University '11, director of the laboratory of the Grain Belt Serum Co., July 26.

Otto O. Owen, 63, Indianapolis, Ind., Indiana Veterinary College '23, July 29.

Michael J. Dunleavy, 78, Denver, Colo., Chicago Veterinary College '97, was interested in race horses, and one of the founders of the Gentlemen's Riding and Driving Club, August 11.

George Addison Cary, 50, Brookville, O., Ohio State University '12, died at the wheel of his automobile while in Indianapolis attending the A. V. M. A. convention, August 14.

E. E. Peacock, 60, Dallas, Tex., St. Joseph (Mo.) Veterinary College, practiced privately for several years, entering the B. A. I. service in 1918, supervisor at Dallas for 12 years, August 21.

W. C. Bailey, 62, Kentwood, La., civic and political leader in his community for many years, member of the town council for eight years, August 24.

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